Computer Self-Efficacy of GED Examinees and GED Test Results

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ABSTRACT

The purpose of this study was to investigate whether relationships existed between the degree of computer self-efficacy of examinees and their performance on the computer-based 2014 General Equivalency Diploma (GED) exam. Recommendations for both research and practice were made that addressed potential challenges. The study was developed based on the concerns from the GED community regarding computer-based testing and how it may effect student performance.

The study was conducted at two technical colleges in Georgia and used a convenience sampling process to gather 100 surveys and 15 interviews from first time computer-based GED examinees. Data were collected using the Computer Self-Efficacy Survey for Adults, created by James H. Brown, and interviews conducted by the researcher. Descriptive statistics, an analysis of variance (ANOVA), factorial analysis of variance tests, and interviews were used for data analysis. Social Learning Theory, created by Albert Bandura (1971), was used for the research study's conceptual framework to explain an individual's perception of his or her ability to use a computer.

Overall findings from the statistical analysis of this study indicated that examinees who had a higher sense of computer self-efficacy scored higher on the Reasoning Through Language Arts and Science sections of the GED exam. Significant relationships were also found to have existed when comparing the examinees' age and socio-economic status. Younger examinees had higher GED exam scores and reported a higher sense of computer self-efficacy than did the older population on the Reasoning Through Language Arts and Science sections of the exam. For the same sections, individuals who reported a higher annual household income also scored higher on the exams and had a higher sense of computer self-efficacy. Overall males scored higher on

Reasoning Through Language Arts and Science, but there was not a significant difference in the scores. Interviewees felt comfortable taking the exam on computer, did not experience anxiety or uneasiness, felt confident in their abilities to use a computer, and did not feel they needed to become familiar with the computer prior to taking the exam.

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DEDICATION

To my loving and supportive husband, Josh Southerlin, call the ball Maverick!

Chapter I

INTRODUCTION

The conversion of the General Equivalency Diploma (GED®) paper-based test to a computer-based test has been a topic of discussion for over 20 years. As was the case with many large-scale test developers, GED Testing Service® began investigating the transition of the GED exam from paper to computer tests. "A significant concern then arises as to whether offering only a computer-based format of the GED exam will reduce the number of candidates taking the GED exam because of possible variation in the candidate population's level of familiarity with computers" (George-Ezzelle & Hsu, 2006, p. 2).

Parshall and Kromrey (1993) brought an analysis of examinee characteristics associated with mode effect on the high-stakes Graduate Record Examination (GRE) test to the forefront of discussion in their presentation at the Annual Meeting of the American Educational Research Association. Until this time, only the ACCUPLACER was being delivered on computer; developed and administered by the College Board in 1990, this exam was a lower stakes college admissions entrance exam (Luecht & Sireci, 2011). Although various exams would follow the process of becoming computer-based or computer adaptive (Luecht & Sireci, 2011) it would not be until 2006, when the GED Testing Service published results of the GED candidate computer familiarity study, that the discussion of computerizing the GED would become conceivable. Using a logistic regression model, data were analyzed to assess correlations "between computer comfort, age, highest grade complete, test format preference, and likelihood and testing if the GED exam had been available only in computer-based format" (George-Ezzelle & Hsu, 2006, p. 11). George-Ezzelle and Hsu's research study produced initial results for GED examinees' computer familiarity and although there were positive results for the study, limitations were identified by the researchers. The majority of the responses indicated that they had prior experience with computer-based exams, worked on a computer at least once a week, preferred a computer-based format and if given the option would have taken the GED if only available on computer (George-Ezzelle & Hsu, 2006).

As American businesses continued to demand a more educated labor force, the GED Testing Service® implemented the new exam as a means to provide a workforce to meet those needs. The GED Testing Service® contracted with Pearson Vue testing services to ensure that earning a GED would not only be equivalent to a high school diploma, but also be the starting point for college admissions. Additionally, the new test would help adults remain competitive in the workforce. States across America slowly migrated to the new mode of testing with reluctance and apprehension (GED Testing Service®, 2013b). The new GED exam was implemented nationwide in January 2014, leaving the computer-based exam as the only testing option for examinees.

General Education Development computer-based testing has become a nation-wide concern as the fear of taking a test on the computer rises (Clymer, 2012). "Many recognize the need for computerizing the GED exam as well as the importance of computer literacy in the marketplace. Nonetheless this change may present challenges in effectively serving test takers that lack access to and proficiency with computers" (Clymer, 2012, p. 5).

In the years 2012 and 2013, there was a state-wide initiative for Georgia to eliminate paper-based testing; and according to discussions this researcher had with both test takers and adult education staff, many were apprehensive about the migration to computer-based testing. Taking the GED on computer versus the traditional paper-and-pencil format was perceived as posing challenges for certain populations due to their lack of computer literacy and low self-efficacy levels. "Since access to computers has long been a problem for many adult education providers, this computer literacy need is an issue that will warrant serious attention" (Clymer, 2012, p. 5).

In their study of secondary analysis of data in 1993, Parshall and Kromrey made the suggestion that continued research be conducted to determine if test mode had any impact on test performance. Although their research focused on the test mode effect, one of the analyses that was conducted was to determine if any relationship existed between mode effect, variety, and amount of computer experience by asking the following questions: "how often do you use a computer, how often have you used a mouse on a personal computer and, for what kinds of activities do you use a personal computer" (Parshall & Kromrey, 1993, p. 22). Although results suggested minimal impact to support a relationship between computer experience and test mode effect, various limitations were noted, due to the design of the study, by the researchers. It should be recognized, however, that this 1993 research study was conducted prior to Compeau and Higgins coining the term "computer self-efficacy" and the development of the initial test of measurement. It could be implied that Parshall and Kromrey were attempting to investigate computer self-efficacy levels prior to creation of the concept.

> The variables investigated in this study showed only a relatively weak relationship to mode effect. Further investigation tailored to this question should be conducted in order to determine those variables which distinguish those examinees whose performance is affected by mode of test administration from those whose performance is not (Parshall & Kromrey, 1993, p. 39).

According to Al-Amri (2008), there had been minimal research conducted on the association between examinees' computer familiarity and performance on computer-based testing. Because the GED Testing Service® implemented the new assessment in January 2014, research should be conducted to investigate if potential problems associated with computer-based testing existed.

> While the needs of this testing program have been established psychometrically, it is important to consider other points of view. Issues affecting examinees must be evaluated as well, such as prior experience with computers, proficiency, and examinee comfort, as these factors may act as mediators or moderators in performance across modes (Poggio, Glasnapp, Yang, & Poggio, 2005, p. 26).

An informal survey was conducted at the 2013 Adult Literacy Conference held in October in Atlanta, Georgia. The Assessment Services Coordinator and the Dean for Adult Education at Ogeechee Technical College spoke with colleagues in order to gain anecdotal or personal concerns. Approximately 40 individuals were asked if they were aware of any concerns regarding the implementation of a computer-based only GED exam. Although there were limited statistical data that indicated any concerns surrounding the technical details of the new exam, teachers, directors, state staff, and examiners stated that examinees statewide had voiced concerns that they had limited computer skills and significant computer anxiety that prohibited their interest in attempting the 2014 exam series. In addition, Clymer (2012) indicated that "preparation programs will have to be revamped to include not only computer literacy and keyboarding for those without these skills because the new GED will include higher-order thinking skills, which are not the focus of the current GED test" (p. 6).

The 2014 GED exam focused on adult learners by opening doors to college, job training, and career opportunities through an alignment process that was representative of current high school standards delivered exclusively on computer. To ensure all individuals were ready and capable of employment or transition into post-secondary education, it was imperative that the GED be viewed as comparable to the high school diploma. The 2014 GED Series Test® (2014b) was comprised of the following; 1) Reasoning Through Language Arts (RLA) (estimated 150 minutes to complete), 2) Mathematical Reasoning (estimated 120 minutes to complete), 3) Science (estimated 90 minutes to complete), and 4) Social Studies (estimated 90 minutes to complete). This exam utilized seven different item types: extended response, drag-and-drop, drop-down, fill-in-the-blank, hot spot, multiple choice, and short answer. All of these testing modules required the examinee to possess at least a basic computer skill level.

> In addition to using a mouse, test-takers must be able to: scroll down a page, drag-and-drop answers to a graph or chart, navigate between tabs to read passages, type two short answers and two extended responses, use basic word processing tools, select answers or symbols from drop-down menus, and use a virtual calculator (Lipke & Farrell, 2013, p. 8).

Lipke and Farrell's study was used to investigate the extent to which computer-oriented self-efficacy influenced examinees' performance on the computer-based GED exam. Concerns needed to be investigated and addressed so individuals taking the computer-based GED can be successful and remain competitive with high school graduates. Identified concerns with the 2014 version of the computer-based GED exam could lead to testing modifications and/or computer skills training which could be implemented in the local GED centers.

Conceptual Framework

Self-efficacy is rooted in Social Learning Theory and was founded by Albert Bandura as a means to explain an individual's perception of his or her ability to deal with certain situations (1971). Social Learning Theory is multi-dimensional, therefore this research only focused on the role of cognitive factors in individual behavior. Bandura promoted two sets of expectations as cognitive forces that drove an individual's behavior. One is outcomes and the other is self-efficacy. Self-efficacy is a perceived behavior influenced by choice of actions, quality of an individual performance, and the level of persistence (Compeau & Higgins, 1995b). Self-efficacy is the conviction that one can successfully accomplish the behavior required to produce a particular outcome. This concept is grounded in four basic areas including: 1) cognitive, 2) emotional, 3) motivational, and 4) selective processes. Individuals with weak self-efficacy tend to shy away from tasks they perceive as difficult, have low aspirations with weak goals, and tend to dwell on personal deficiencies rather than focus on overcoming adverse situations (Bandura, 1997). Likewise, according to Compeau and Higgins (1995b) one can generalize that individuals with higher computer self-efficacy would be expected to be able to comfortably use computers and have positive experiences doing so.

Computer self-efficacy was built on Bandura's definition of self-efficacy as it applied to individuals' perceptions of their ability to be successful in their utilization of a computer. Compeau and Higgins (1995b), in *Computer Self-Efficacy: Development of a Measure and Initial Test*, defined computer self-efficacy as "a judgment of one's capability to use a computer. The concept is not concerned with what one had done in the past but rather with judgments of what could be done in the future" (Compeau and Higgins, 1995b, p. 192). Their three dimensions to computer self-efficacy are: 1) magnitude, 2) strength, and 3) generalizability.

Statement of the Problem

The problem of this study was the concern that by implementing a GED computer-based only exam, student performance may be negatively impacted by the lack of computer skills and efficacy. Since the migration to a computer-based only exam minimal research has been conducted to determine if concerns exist with examinees' ability to be successfully on the GED.

Purpose of the Study

The purpose of this study was to investigate whether relationships existed between the degree of computer self-efficacy of examinees and their performance on the computer-based 2014 GED exam. Recommendations are made that would address any challenges generated from the study.

Research Questions

This study addressed the following research questions:

1. What relationships, if any, exist between the computer self-efficacy of examinees and participants' performance on their initial section of the computer-based GED exam taken?

2. To what degree, if any, do the following demographic factors affect the interactions between computer self-efficacy and a computer-based GED exam?

a) age

b) gender

c) ethnicity

d) socio-economic status

3. What challenges do GED examinees experience when taking a GED computer-based exam?

Significance of the Study

When computer-based GED testing began, technical colleges in Georgia and across the United States were searching for a means to reduce costs. Computer-based GED testing was the perfect avenue to decrease staff and cut long-term cost, with little regard for issues examinees may have with computer-based testing (Clymer, 2012). Many assumed that there were significant apprehension and concerns with migrating the GED from a traditional paper-based exam to a computer-based exam but there was limited research on which to base this conclusion and additional research needed to be conducted to provide a more concrete understanding. "Future research should focus on the impact of self-efficacy on development of computer skills and on understanding the generalizability of computer self-efficacy" (Compeau & Higgins, 1995b, p. 207). The results of this study will provide greater insight into the relationship between test-takers' computer skills and attitudes and their performance on the new computer-based GED exam." Further, the results will prompt more discussion surrounding computer-based GED testing and the impact it may have on examinees in Georgia.

Limitations of the Study

The first limitation of this study was the possibility of a small sample size due to the desire to collect data from first time computer-based GED examinees. It was difficult to predict the number of examinees that would participate in the study, therefore by gathering data from surrounding technical colleges it increased the sample size and addressed the limitation issue. In addition, convenience sampling was used which limits the generalizability of the data. The third limitation of this study was the nature of the student-reported data. Relying on perceptual data is subjective and although this study focused on examinees' feelings and emotions, it can be assumed that a concern could exist due to perception. Perceptual data limited the degree of confidence to which the conclusions could be inferred. In addition, the participants of this study were from one geographical region of Georgia, and outcomes may not be generalizable for the entire state.

The research study gathered data that produced statistical findings that focused on computer self-efficacy and concerns individuals had regarding taking the exam on computer. The statistical findings from the study can be use to provide valuable information regarding possible modifications or changes to the ways people prepare for the new exam. "With the new test being delivered exclusively on computers, adult literacy providers must consider teaching computer skills in order to prepare learners for testing, if they have not already" (Lipke & Farrell, 2013, p. 10).

Definitions of Key Terms

This section lists and provides conceptual and operational definitions of key terms used in this study:

2002 Series GED Test: Version of the GED exam given from 2002 to December 2013 (GED Testing Service®, 2014a).

2014 Series GED Test: Version of the GED exam beginning January 2, 2014 (GED Testing Service®, 2014a).

Coastal Pines Technical College (CPTC): A unit of the Technical College System of Georgia (Technical College System of Georgia, 2014d).

Computer self-efficacy: Compeau and Higgins (1995b) were the first to coin the term computer self-efficacy and referred to it as "a judgment of one's capability to use a computer" (p. 192).

Demographic factors: Characteristics assigned to age, gender, ethnicity, and socioeconomic status (Brown, 2008).

Examinee: An individual who is taking the exam on computer (Parshall & Kromrey, 1993).

GED Analytics™: Real time database created by GED Testing Service® used to create and generate reports for GED examinees nationwide (GED Testing Service®, 2014a).

GED Testing Service®: A joint venture between the American Council on Education (ACE) and Pearson. The new organization was formed in 2011 and was modeled to represent a public-private partnership" (GED Testing Service®, 2014b).

Georgia Adult Learner Information System (GALIS): Statewide data system used to identify students enrolled in Adult Education Programs in Georgia (Technical College System of Georgia, 2014b).

TCSG Navigator: New data system for GED testing in Georgia that replaced PASSPORT effective April 1, 2014 (Technical College System of Georgia, 2014c).

Ogeechee Technical College (OTC): A unit of the Technical College System of Georgia (Technical College System of Georgia, 2014d).

Pearson Vue: Provider of computer-based testing solutions for information technology, academic, government, and professional testing programs, including the GED (Pearson Vue, 2014).

Preparation programs: State supported adult education programs operated through a technical college in Georgia (Technical College System of Georgia, 2014a).

Self-efficacy: Self-efficacy is situational and highly influences people's "decisions, goals, their amount of effort in conducting a task, and the length of time they persevere through obstacles and difficulties" (Khorrami-Arani, 2001, p. 18).

Social Cognitive Theory: Albert Bandura's (1971) theory that conceptualizes cognitive, vicarious, self-regulatory, and self-reflective processes as they relate to human motivation and behavior (Bandura, 1997).

Technical College System of Georgia (TCSG): Directs Georgia's technical colleges, academic, adult education, and workforce development programs (Technical College System of Georgia, 2014d).

Walk-in examinee: A GED examinee who has not received any preparation from a state supported adult education center (Technical College System of Georgia, 2014a).

Summary

This chapter offered a brief introduction to computer self-efficacy and the reasoning behind the need for further investigation into concerns associated with computer self-efficacy levels and performance on the computer-based GED exam. Limited research has been conducted on the perceptions individuals have of their own ability to utilize a computer for computer-based exams. With technology advances consistently on the rise, the anticipation is that computer skills will continue to be necessary in order to secure and maintain employment. The GED exam has been no exception to this, as the nation transitioned to a solely computer-based exam in 2014.

Chapter II

REVIEW OF THE LITERATURE

This research study was designed to assess computer-based GED examinees' levels of computer self-efficacy and the influence these had on their performance. A review of literature was conducted to create an understanding of the concerns surrounding computer-based testing, generate a foundation for the study, and to assist in identifying gaps that may exist in the research. The following topics were reviewed to ensure a comprehensive review a literature was conducted 1) the historical context and background of the GED test, 2) the theoretical foundation of self-efficacy, 3) Bandura's concept of self-efficacy, 4) the founding of computer self-efficacy, and 5) measurements of computer self-efficacy.

A list of topics were used to complete the research for this study which included: application of Social Cognitive Theory, training for computer skills, overcoming computer anxiety for adult learners, computer self-efficacy, E-learning self-efficacy, technostress, self-efficacy scales, validations, Social Cognitive Learning, social modeling, digital divide, and behavior modeling. The following databases were used to research the above topics: ERIC, GALILEO, Google Scholar, Proquest, VTEXT, (Networked Digital Library of Theses and Dissertation), Research Gate, GED Testing

Service®, Pearson Vue, GED Analytics™, GALIS (Georgia Adult Learners Information System).

History of Computer-Based Testing

The first large-scale exams to become computer-based appeared in 1985; the United States Army's Computer Adaptive Screening Test, the College Board's Computerized Placement Test, currently known as the ACCUPLACER, and the Computerized Adaptive Differential Ability Tests of the Psychological Corporation (Luecht & Sireci, 2011, Salkind, 2010) were among the first. The ACCUPLACER was considered a low-stakes test, although it was viewed as the first transition to computer-based testing for the educational field. According to Luecht and Sireci (2011), the first high-stakes test that was given as a computer-based test was the certified network engineer (CNE) examination. That exam was administered in the Drake Prometric sites beginning in 1990 and was subsequently followed by the Education Testing Services Graduate Record Examination (GRE) in 1992 at Sylvan Learning Centers. Since that time, various agencies, companies, and education institutions have migrated to computer-based testing, to include National Council Licensure Examination (NCLEX) for nursing students, the Armed Services Vocational Aptitude Battery (ASVAB), and the Graduate Management Admission Council (GMAT).

Although numerous concerns surrounding computer-testing existed, the desire to migrate towards a more accessible means of test administration outweighed those issues. Designing an exam to meet the technical specifications can be costly, and the process must also take into account the importance of maintaining the validity and reliability of the test questions. Delivering an exam on computer has transformed from simple computer-based fixed tests (CFT) to more complex designs of adaptive testing models (Luecht & Sireci, 2011). Earlier forms of computer-based testing consisted of testing terminals that were directly attached to a mainframe computer, making the process of mass distribution cost prohibitive. With computers being readily accessible, including laptops, tablets, and even smartphones, computer-based testing has exploded onto the market. Various types of computer-based exams were offered in secondary and post-education, employment, adult education, industry, professional, and military arenas because testing centers and labs could be arranged into classrooms, auditoriums, conference rooms, and even hotels. This made computer-based testing more accessible and convenient to examinees and administrators. Educational institutions used computer-based testing as part of the admissions process and business and industry used multiple types of psychological and employment tests to assist in the hiring process (Luecht & Sireci, 2011).

Historical Background of the GED

The origins of the GED dates back to 1942 when it was created by the American Council on Education (ACE) to address the need World Word II veterans were facing upon their return home from the war. Many of the veterans did not possess a high school diploma and were facing difficulties in securing employment. Originally, the American Council on Education had been created during World War I to:

> involve the national associations of high education in the war effort, and one of its first objectives was to prevent college-educated men from being used on the battle lines in order to avoid ‘destroying the reservoirs for the production of experts’ and ‘the reckless waste of irreplaceable talent’ (Quinn, 2002, p. 7).

Upon the end of World War I, the council was charged with designing tests that would assist in the selection, training, and assignment of military personnel. In an attempt to ease the transition for veterans, the ACE released the GED after several years of designing and developing the test. It was announced in mid-1943 that over 400 institutions in the country had officially accepted the exam for credit into respective institutions (Quinn, 2002). It was estimated, that since 1942, over 18 million Americans have received their GED and have used the diploma as a stepping stone to better employment or entrance into college (Clymer, 2012).

Since that time, the GED exam has undergone revisions in 1978, 1988, 2002, and again in 2014. Changing attitudes towards education caused the 1978 exam to shift focus, making social studies and science separate tests geared towards conceptual knowledge rather than simple memorization (GED Testing Service®, 2014a). The 1988 exam experienced changes that reflected the shift in global awareness and worldwide technological advancements with the addition of a writing sample, increased critical thinking, and problem-solving skills. These revisions encouraged societal awareness and ensured the material be reflective of more adult-related material. As more businesses and industry began requiring either a high school diploma or GED for entry level positions into employment, the 2002 test was designed to mirror a high school diploma (GED Testing Service®, 2014a).

Today, the GED Testing Service Mission Statement is as follows:

> In an ideal society, everyone would graduate from high school. Until that becomes a reality, we, the General Educational Development Testing Service, will offer the opportunity to earn a high school equivalency diploma so that

individuals can have a second chance to advance their educational, personal, and professional aspirations (GED Testing Service, 2009, p. 1).

In 2011, the American Council on Education (ACE) announced a partnership with Pearson Vue charged with the creation of the GED 21st Century Initiative, to include a new computer-based GED exam. The new exam focused on Common Core State Standards reflective of the needs of a global economy and to encourage people to enter college, hence the goal of a redesigned, 2014 version of the exam was conceived (Clymer, 2012).

GED Testing Service® conducted a usability study in 2011 to investigate the transition to a computer-based exam. By working with Pearson Vue to determine how examinees would react to operating computer hardware and software, the study reflected needs identified by the population. The usability study was designed with instruments to assess three different participant traits for the project: 1) age, 2) native language, and 3) level of computer experience. The skills that were measured ranged from basic use of a mouse and keyboard, to interacting with on-screen item types, such as scrolling, drag and drop, and pop-up windows. Three rounds of testing occurred during January and February 2010, resulting in various recommendations that would enhance the ease of the use of the computer upon delivery of the computer-based test. One noteworthy suggestion was to ensure that examinees had basic keyboarding skills; this study was followed up later with the comparability study completed by the GED Testing Service®.

The 2002 version of the exam was administered in a computer-based format in a comparability research study in 2010 by the GED Testing Service®. It was conducted in eleven states: Arizona, California, Colorado, Florida, Georgia, Michigan, Missouri, New

Jersey, North Carolina, Texan and Virginia. These exams were delivered to over 7,500 individuals and were promoted as a paid practice exam. Examinees were offered a tutorial once they began the exam on the computer, and they were allowed the same allotted amount of time as the traditional paper-based exam (GED Testing Service®, 2011a).

> The conclusions reached by these studies led to no changes in policy or program strategy. As GED Testing Service moves forward in adding CBT, it will continue to monitor comparability to ensure that the computer-based GED test is a valid measure of a test-taker's knowledge (GED Testing Service®, 2011a, p. 2).

The computer-based GED exam was originally scheduled to be implemented nationwide in 2012, but due to the outcome of the usability and comparability studies, the original design needed more than 500 modifications to the instruction and delivery of the exam before implementation could occur nationwide (GED Testing Service, 2011b).

Theoretical Foundation of Self-Efficacy

The component of self-efficacy originated from Albert Bandura's Social Cognitive Theory and is the concept that individuals have the power to produce results based on their perceived ability to complete a task. The belief that one is capable of performing certain tasks, in order to attain certain goals, is the foundation for this theory. Bandura distinguished the difference between self-esteem and self-efficacy, as the definitions were too often mistakenly identified. Unlike self-esteem, which focused on judgment of self-worth, self-efficacy focused on judgments of personal capability. Khorrami-Arani (2001) also indicated in her research, that Olivia and Shapiro "…described the importance of not confusing self-efficacy with self-esteem…both concerned with the judgments of individuals, they do not share any direct relationship with each other" (p. 18). To further clarify, it is important to recognize that while individuals may experience higher self-efficacy in one area, they are not guaranteed to have that same experience in other areas of life. Improving self-efficacy required one of the following events, or judgments, to occur which assists in increasing the level of self-efficacy: 1) feedback from others, 2) modeling after others, and 3) having a successful experience.

> Self-efficacy judgments are held to have a substantial influence on the emotional responses of the individual. Individuals will tend to prefer and enjoy behaviors they feel they are capable of performing and to dislike those they do not feel they can successfully master (Compeau & Higgins, 1995a, p. 196).

Triadic Reciprocal Determinism

Social Cognitive Theory identified three elements which influenced self-efficacy: 1) behaviors, 2) environment, and 3) personal or cognitive factors. Bandura labeled this as the triadic reciprocal determinism, causing factors to influence each other to form a human agency. The relationship among internal personal factors, external environment factors, and behavior is a bidirectional process that works simultaneously rather than as a single event, causing efficacious people to be cognitive of their opportunistic structures in society. The elements work in tandem and can shift directions based on changing factors such as the environment, opportunities, alterations in behavior, or feedback from others. "By influencing the choice of activities and the motivational level, beliefs of personal efficacy make an important contribution to the acquisition of the knowledge structure on which skills are founded" (Bandura, 1997, p. 35). Hence, positive feedback may then lead to a higher level of self-efficacy, whereas negative feedback or behavior modeling would tend to enhance negative self-perceptions causing a rise in lower levels of self-efficacy.

"Beliefs of personal efficacy also regulate motivation by shaping aspirations and the outcomes expected for one's efforts" (Bandura, 1997, p. 35). Individuals' desire to succeed is a contributing factor toward Social Cognitive Theory; if a fear of failure exists the motivating factor driving them towards the desire will diminish.

As part of his Social Cognitive Theory, Bandura coined the term "self-efficacy" to describe individuals' perceptions and beliefs of their ability to complete a task. In 1986, Bandura defined self-efficacy as:

> People's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses (Compeau & Higgins, 1995b, p. 191).

According to the theory, self-efficacy has significant influence over one's goals, actions, successes, and even failures. As individuals begin to learn from their successes and failures, they use the information to better assist them in assessing their own self-efficacy. Bandura noted that there are four principle sources for the acquisition of the information: 1) actual experiences that are derived from exposure to the situation, perhaps by observation, 2) vicarious experiences that are learned indirectly, 2) verbal persuasion through encouragement from others and 4) physiological indicators such as anxiety or fear due to a lack of skills (Miltiadou & Yu, 2000). In more detail, prior experience is considered to be the most reliable and valuable source of learning any new material; learning through experience offers exposure to situations that cannot be duplicated through experiment. Observing others at a task that may seem overwhelming or too difficult provides a sense of encouragement to others, therefore offering a sense of inspiration. In addition to observation, verbal encouragement from others offers support and increases their personal strength resulting in an enhancement in the inspiration level.

Lastly, physiologically changes in the body including sweating, increased heart rate, shaking, or muscle tension, may show signs of an increase in anxiety. This increase in anxiety can be a deterrent to attempting new tasks or exposure to various situations which could seem overwhelming (Miltiadou & Yu, 2000).

Self-Efficacy Judgments

The concept of self-efficacy is multidimensional and includes three separate judgments: magnitude, strength, and generalizability. Magnitude refers to the level of a task which is perceived as attainable by the individual. People with higher levels of self-efficacy are able to view their ability to complete more difficult tasks, whereas those with lower self-efficacy are only able to perceive their ability to complete more, lower level tasks. Self-efficacy strength is the second dimension that focused on the level of belief an individual has about their ability to conquer obstacles, complete tasks, and face adversarial situations. Their level of self-efficacy could determine if they will be deterred from more difficult tasks and if they have a lower level of self-efficacy then they are more susceptible at shying away from situations that appear overwhelming. Generalizability focused on "the extent to which perceptions of self-efficacy are limited to particular situations" (Compeau & Higgins, 1995b, p. 192). People may only be able to perform certain tasks under certain situations, therefore the levels of self-efficacy change according to the circumstance and often become situational (Compeau & Higgins, 1995b).

Self-efficacy is a significant factor to individuals whose tasks or goals may be enhanced and/or threatened by their perceived ability. The contribution of self-efficacy towards successes and failures may be a factor when a decision is made to pursue attainable goals or complete what some may consider fairly minimal tasks, like the use of a computer.

Development of Computer Self-Efficacy

The term computer self-efficacy has been defined by Compeau and Higgins (1995b) as "a judgment of one's capability to use a computer" (p. 192). Compeau and Higgins discovered through their research that computer self-efficacy had a significant impact on individuals' perceptions of their ability to use a computer and that if they failed to perceive themselves as being competent they would be less likely to use a computer. Using Bandura's Social Cognitive Theory's component of self-efficacy, Compeau and Higgins (1995b) published the first research on computer self-efficacy "aimed at understanding the impact of self-efficacy on individual reactions to computing technology" (p. 2). As the dimensions of self-efficacy identified distinct judgments, Compeau and Higgins (1995b) incorporated those concepts into the definition of computer self-efficacy. Just as the magnitude of one's perceived level of capability can be used to assess ability to complete tasks, face situations, or overcome obstacles, the same judgment can be used to assess one's ability to complete more difficult computer-oriented tasks. The higher the level of computer self-efficacy, the more likely an individual will be capable of adapting and using computer software and hardware.

Likewise, if an individual has lower computer self-efficacy, the tendency to be reluctant at facing those challenges increases. Strength in computer self-efficacy refers to the "level of conviction about the judgment, or the confidence an individual has regarding his or her ability to perform the various tasks" on a computer (Compeau & Higgins, 1995b, p. 192). If individuals have higher levels of computer self-efficacy, it is expected they would be able to adapt more quickly to various computer programs and software

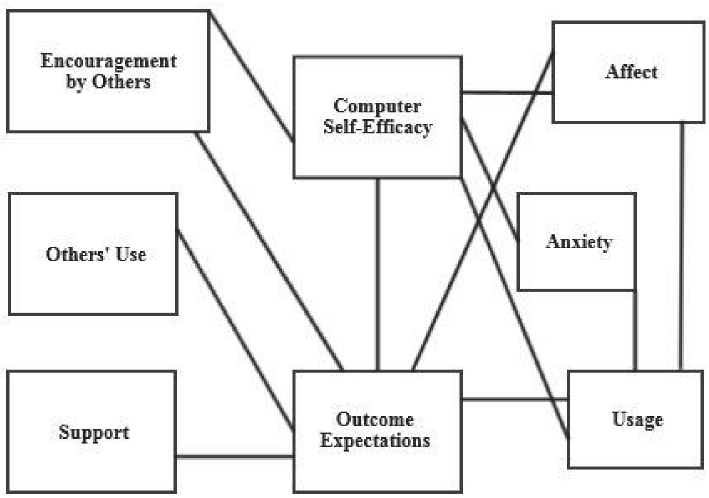

Figure 1: Compeau and Higgins Computer Self-Efficacy Research Model. Adapted with permission (see Appendix F) from "Computer self-efficacy: Development of a measure and initial test," by Compeau, D. R., & Higgins, C. A. 1995, *MIS Quarterly,* 19, 194.

(Compeau & Higgins, 1995b). Compeau and Higgins' Computer Self-Efficacy Research Model process is shown in Figure 1. Compeau and Higgins (1995b) used Social Cognitive Theory as the foundation for computer self-efficacy; the higher the level of computer self-efficacy the higher the expected job-related outcomes, or performance. The assumption was that people who had higher computer self-efficacy levels tended to enjoy their time working with a computer (liking), therefore producing less anxiety and resulting in heavier computer use (outcome).

An article published in 1993 on the effects of high stakes computer-based GRE testing was found to be one of the first studies designed to investigate if test mode affected performance outcomes (Parshall & Kromrey, 1993). Parshall and Kromrey presented data from a study of secondary analysis to the Annual Meeting of the American Educational Research Association in Atlanta, Georgia, in April 1993. Using data from the Educational Testing Service's Graduate Record Examination (GRE) Program's computer-based testing pilot from the fall of 1991, Parshall and Kromrey analyzed characteristics from 1,114 examinees to determine if test mode had any effect on performance. Included as a characteristic were demographic variables, and computer-use variables including experience, frequency, and mouse usage. Because this was a study that utilized secondary analysis, many of the outcomes proved to be inconclusive; however, the research could be considered the foundation for the discussion of concerns surrounding the transition of paper-based tests to computer-based tests.

The GED Testing Service® conducted its own research on GED computer-based testing, though it was limited and addressed computer familiarity rather than the computer self-efficacy levels of examinees, indicating a need for a more thorough investigation into these concerns (George-Ezzelle & Hsu, 2006). Surveys were mailed to previous GED examinees in all 50 states and the District of Columbia who took their exam in 2004; a total of 44,920 surveys were mailed with an 11% response rate. The researchers indicated limitations that were recognized in the study including, incorrect mailing addresses, recent examinees, and a nonresponse bias. "Even though the respondents were able to be matched to the population of GED candidates on variables such as age, educational level, and race/ethnicity, no population data exists on measures of computer familiarity" (George-Ezzelle & Hsu, 2006, p. 13).

Goldberg and Pedulla (2002) focused on the computer familiarity of the practice Graduate Record Exam (GRE). Although the GRE was an entrance test used for admission into college graduate programs and had been computer-based for 10 years, the understanding of computer familiarity could be implied for any computer-based assessment. The authors used the following as one of three research questions to examine whether a test takers' level of computer familiarity had any association with test scores: "What is the relationship between computer familiarity and CBT score?" (Goldberg & Pedulla, 2002, p. 1058). Their suggestions for further study into the impact computer familiarity may have on the successful completion of a computer-based exam could imply the necessity for determining the need of an examinee's computer self-efficacy.

> The effect of computer familiarity on CBT performance also deserves further attention, especially considering the proliferation of computerized tests beyond those designed primarily for student populations such as in this study. In particular, it is likely that computer usage is more variable among people who are not part of the traditional undergraduate age group and among people who are more socioeconomically diverse (Goldberg & Pedulla, 2002, p. 1066).

A multi analysis of covariance (MANCOVA) was used to assess whether there was a statistical relationship between computer familiarity and test condition. It was determined that there was a significant main effect on all three parts of the GRE when one factored in computer familiarity, indicating that test mode did have an effect on the scores for GRE test takers (Goldberg & Pedulla, 2002).

"One of the main contributing factors that should be examined when conducting comparability research is the existing computer familiarity of test takers and its interaction with performance on CBT" (Al-Amri, 2008, p. 24). Al-Amri discussed in his research that upon a considerable review of literature, it could be concluded that measuring the level of a test takers' computer familiarity was imperative when discussing findings regarding computer-based testing. Al-Amri attempted to answer the extent to which computer familiarity affected participants' performance on a computer-based exam by utilizing the high-stakes Test of English as a Foreign Language (TOEFL). One of the six research questions the researcher attempted to answer included, "To what extend does prior computer familiarity affect participants' performance on CBT" (Al Amri, 2008, p. 26). The researcher used a questionnaire to measure the computer familiarity and computer attitude over a 3-month time span in a first-year student medical course. Correlations existing between the examinees' computer familiarity scores and their performance on the computer-based exam indicated no significant relationship existed (Al Amri, 2008).

In their article titled *Computer Based Assessment (CBA): A Long Way to Innovation*, Schär and Hofer (2007) suggested that the conversion to computer-based testing should be a holistic approach through all phases of development. They summarized the pros and cons associated with computer-based testing which reflected similar concerns categorized by other authors with similar research questions; computer anxiety and computer familiarity were two of the primary concerns with computer-based testing (Schär & Hofer, 2007).

In more recent years, He and Freeman (2010) investigated the concept of computer self-efficacy by conducting a study using 281 undergraduate business major students enrolled in two Management Information Systems courses. He and Freeman (2010) combined portions of various survey instruments to create a tool used in a pre-test and post-test online format that measured the degree to which social norms, computer anxiety, gender, age, and job status affected the computer self-efficacy of individuals. The instrument was a 5-point Likert survey, combined with Compeau's Computer Anxiety Rating Scale (CARS), to measure computer anxiety and Venkatesh and Davis' instrument which measured social norms as it related to Information Systems Theory. Markas'survey instrument that measured general self-efficacy and two other items which measured individuals' attitudes towards computers were also used. This study was instrumental because the authors argued that computer self-efficacy is rarely explored in research literature and that more exploration should be conducted in order to create a foundation for other researchers in the field (He & Freeman, 2010).

The results of He and Freeman's (2010) study suggested no significant correlation exists between computer self-efficacy and gender, age, job status, or social norms. The most significant determining factor in relation to individuals' computer self-efficacy was the extent of their computer knowledge, which significantly reduced their computer anxiety. There were significant limitations with the study, and the researchers suggested there were issues with the validity of several of the indicators used to measure computer self-efficacy.

The Digital Divide

The digital divide is a term often used by sociologists or economists to describe the technological gap that exists between social classes. Attewell (2001) suggested that "poor and minority families are less likely than other families to have access to computers or the internet, creating a technology gap between 'information haves' and 'information have-nots'" (p. 252). The differences that may exist within the divide are driven by factors such as age, ethnicity, gender, and socioeconomic status; these factors can affect households, individuals, businesses, regions, and even countries (Attewell, 2001). The research outcomes vary in response to the reasoning behind the digital divide. Attewell (2001) suggested the inequality stemmed from financial resources hindering lower income families' accessibility to computers and the internet. Cooper (2006) proposed that gender was the most significant contributing factor affecting the digital divide, whereas Volkom, Stapley, and Amaturo (2014) found that the generation gap of age was the identifying factor when defining the digital divide.

Technology is consistently evolving and according to Volkom et al., (2014), the generational gap existing within the digital divide suggests that age "…has recently been reported to be a more important predictor of technology use than sex" (p. 558). In their review of literature, it was found that older adults, having lower self-efficacy towards computers, tended to be more intimidated by the use of technology than younger adults. Volkom et al. (2014) conducted their research in an effort to determine if gender had any effect on the use of technology. In addition, they wanted to determine if there was sufficient reason to suggest younger participants were more comfortable with computers and experienced less anxiety and frustration than that of older adults. The sample consisted of 276 self-reported adults who completed a 43-item questionnaire designed to measure frustration levels surrounding computers, reasons for using social media, and perception questions towards technology. The statistical findings revealed that older adults were more frustrated and less comfortable with current technology than the younger generations, and that males had a greater comfort level than females when working with technology (Volkom et al., 2014).

Copper (2006) conducted a meta-analysis from 20 years of research material which proposed there were differences between gender within and across the digital divide. Results indicated that females suffered more than men from computer related anxiety. An increase in anxiety generated more negative attitudes toward computers, causing females to use computers less often in comparison to men. Although Copper suggested that females were at a technological disadvantage, the evidence from the research also indicated that people from all ages, as well as internationally, were affected by the divide. Cooper's research study was one among a wide range of research on the digital divide and suggested that "technology is arguably the lynchpin of our modern society. It is hard to conceive of many aspects of our lives that do not rely on technology in general and computers in particular" (Cooper, 2006, p. 320).

The United States Census Bureau began asking key questions regarding computer usage in 1984 and internet access in 1997. In an effort to produce data that targeted areas of the country with minimal or limited access to computers and internet access, the 2008 Broadband Data Improvement Act was created. The United States Census Bureau followed by adding targeted questions on the 2011-2013 American Community Survey (ACS). The ACS is an ongoing annual survey that provides data for communities to use in planning for investments and services needed within their respective area. The survey assists federal and state government in financial distribution to communities based on need (File & Ryan, 2014).

File and Ryan reported, in the 2014 American Community Survey report, that an estimated 83.8% of the homes in the United States had computers and 74.4% had Internet access. This is a considerable shift from 1984 when only 8.2% reported having a computer and in 1997 only 18% reported Internet access. Likewise, of those percentages in 2013, those who reported higher usage were of the ages 15-34, white non-Hispanic, and more than $150,000 household income (File & Ryan, 2014, p. 4). In addition, the statistical data indicated that males and females both had readily available access to computers and the Internet in their home. There was a significant digital gap between those who had a reported disability (739%) and those who did not have a reported disability (90.4%).

Measurements of Computer Self-Efficacy

Bandura created a scale to measure an individual's level of perceived self-efficacy. He strongly encouraged using the approach that no one measure fits all, and levels should be designed to meet the needs of those being assessed. He warned that discretion should be used when designing levels of measurement, arguing that such an approach could disassociate meanings from perceptions. Instead, he argued, "scales of perceived self-efficacy must be tailored to the particular domain of functioning that is the object of interest" (Bandura, 2006, p. 307). Bandura stated that self-efficacy is only concerned with one's perceived capabilities and that constructs should reflect a judgment of capability rather than a statement of intention. Bandura (2006) wrote a Guide for

Constructing Self-Efficacy Scales as a tool to be used in the creation of self-efficacy measurement scales.

According to Bandura, self-efficacy scales should include content validity, conceptual analysis of the relevant domain of functioning, and gradations of challenge encapsulated into a response scale format. In order to minimize response biases, the self-efficacy scale must have "safeguards built into the instructions and the mode of administration" and be recorded privately, identifiable by code numbers instead of names (Bandura, 2006, p. 314).

Murphy Computer Self-Efficacy Scale

Various scales had been developed to measure computer self-efficacy and have been modified from the well-known Murphy scale. The Murphy computer self-efficacy (CSE) scale measured subscales of hardware, software, and mainframe skills which were considered potentially outdated due to current advancements with computers and technology (Brown, 2008). The Murphy scale was developed, in the late 1980s, in response to a need to address a gap in the measurement of computer self-efficacy. At the time of the research, Murphy found that the only scales that existed measured attitudes towards computer technology.

The scale consisted of a 42-item response survey created and submitted to an expert panel of five for review; the panel subsequently removed 10 questions for a total of 32. The scale was created in a 5-point Likert-type format with each question employing a positive question beginning with the phrase "I feel confident" and ranging from very little confidence to quite a lot of confidence. The items were then coded into three factor areas: 1) Beginning Level Computer Skills, 2) Advanced Level Computer

Skills, and 3) Mainframe Computer Skills. Implications for this study suggested continuous development of measurement scales for computer self-efficacy, especially those using actual measures or observations, those working with gender analysis, and computer attitude in relation to computer self-efficacy (Murphy, Coover, & Owen, 1988).

Karsten and Roth (1998) published the results of a study on computer self-efficacy at the university level. Using a Likert-type scale design, the Murphy Computer Self-Efficacy Scale, to measure pre and post computer self-efficacy, they assessed 156 students enrolled in three sections of Introduction to Information Systems in an undergraduate year. The analyzed data, from a two-tailed *t* test and correlational analysis, implied that there was a significant difference between the computer self-efficacy levels of students at the beginning of the course compared to their levels at the end of the semester. The researchers recognized that similar measures existed which provided a more in-depth analysis of computer self-efficacy. "A need remains for continued research to refine, analyze, and compare the several available CSE measures from both an educator's and researcher's viewpoint" (Karsten & Roth, 1998, p. 67). Prior to this research, computer self-efficacy research was conducted on individuals in the workforce and was not yet designed for high-stakes computer-based testing.

Compeau and Higgins Computer Self-Efficacy Scale

Prior to Compeau and Higgins' publication, *Computer Self-Efficacy: Development of a Measure and Initial Test* in 1995, only a limited number of measurements or scales of self-efficacy, as it relates to computers, existed. It was suggested, based on the review of literature, that "…examination of existing measures of computer self-efficacy indicated the need for additional development work" (Compeau &

Higgins, 1995b, p. 193). It was found that one of the first initial measurements of self-efficacy in a computing context was in 1986, and it utilized a three-scale item that measured general perceptions of computer usage in participants' jobs. Another measurement tool used a four-item scale, a revision from the three-scale model, however the scale only measured general usage with no questions, specifically targeting computer self-efficacy. Another five-scale tool appeared to have measured some level of computer self-efficacy, but was still limited with the addition of other concepts (Compeau & Higgins, 1995b). Based on their findings of limited measurable scales for computer self-efficacy, their efforts in creating a single measure for computer self-efficacy was the foundation for others to investigate the area without the concerns for specific limitations. One of the hypotheses in the research was "the higher the individual's computer self-efficacy, the higher his/her outcome expectations" (Compeau & Higgins, 1995b, p. 195). Findings resulted in the higher levels of self-efficacy an individual had, the more likely they were to use a computer and experience less computer anxiety.

> Social Cognitive Theory perspective suggests that an understanding of both self-efficacy and outcome expectations is necessary to understand computing behavior. This research, in developing and testing a measure of computer self-efficacy, lays the foundation for future research concerning the Social Cognitive Theory perspective on computing behavior and the unique influence of individuals' perceptions of their computing abilities (Compeau & Higgins, 1995a, p. 206).

Unlike other research measurement scales, Compeau and Higgins' measurement tool used a 10-item scale that focused on job tasks by incorporating questions that would measure task difficulty by capturing differences in self-efficacy magnitude and strength. By applying Social Cognitive Theory, Compeau and Higgins (1995b) used the following areas of influence for 14 hypotheses used to research the measurement scale: encouragement by others, others' use, support, computer self-efficacy, outcome expectations, affect (positive), and anxiety. Encouragement by others was defined as verbal persuasion from others to the individual in the reference group. This influence was expected to have an impact on the individuals' self-efficacy based on positive or negative persuasion. Others' use, was the theoretical rationale for behavior observed by others, or behavior modeling. It assumed that an individual's self-efficacy was influenced by the observation of others' ability to use and actively work on the computer. An organization's support towards the use of and training in computers was expected to have an influence on an individual's computer self-efficacy (Compeau & Higgins, 1995b).

Computer Self-Efficacy Scale for Adults

After the review of literature, there was only one scale that measured computer self-efficacy specifically targeted at adults. James H. Brown modified the original Murphy scale to create a Computer Self-Efficacy Scale for Adults (CSESA) that was designed to gather information focused on adults and the perceptions of their computer skills. "The CSESA was designed to differentiate among adults in their perceptions of their computer skills and abilities across a wide age span, different perceived computer skill levels, gender, and ethnicity" (Brown, 2008, p. 1). The CSEA measured 36 items and required approximately 20 minutes to complete. Brown provided specific guidelines for the recreation, design, and administration of the scale. The survey was designed by both the author and professionals in the education field who taught basic computer courses to adults. It was created with the thinking that many individuals would be self-taught on computers or may have participated in some type of computer skills training. There were three suggestions made to the items 1) keep the item as is, 2) delete the item, or 3) change the way the item is stated. After review from an expert panel, a pilot study (n = 108) was conducted for content validity and the outcomes suggested an overall high mean computer self-efficacy score for three computer domain subscales (Brown, 2008).

Summary

The literature review presented in this chapter provided a historical background for investigation into computer self-efficacy and how it has evolved from Bandura's original perception of self-efficacy. Although there is limited research on computer self-efficacy, in relation to high-stakes testing, the need for additional research has been recommended by various researchers. Although research was conducted on transitioning the GED exam from a paper-based to computer-based format, more information needed to be gathered on the computer self-efficacy of individuals taking the exam.

The problem investigated in this study was the concern that GED examinees had low computer literacy skills that in turn may have caused a lack of appropriate computer self-efficacy impacting success on the computer-based 2014 GED exam. The literature review provided the contextual foundation necessary to guide the study to determine if influence existed between computer self-efficacy of examinees and their performance on the computer-based GED exam and to determine if examinees experienced any significant challenges during the exam.

Chapter III

RESEARCH DESIGN AND METHODOLOGY

A review of literature was conducted and findings were used in Chapter 2 that suggested computer self-efficacy of examinees could have an influence on their performance on the computer-based GED exam. The purpose of this study was to investigate whether relationships exist between the degree of computer self-efficacy of examinees and their performance on the computer-based 2014 GED exam. The Computer Self-Efficacy Scale for Adults (CSESA), test scores, demographic data, and interview data were used to determine if a relationship existed between testing factors. This chapter details the research design, description of the population, research procedures, instrumentation, data collection, data analysis, assumptions of the study, and limitations of the study.

GED Examination Process

The GED examination process required the examinees to use the internet to complete a registration account, schedule their exams, and process payment for those exams. Once individuals had completed that process, they appeared at their chosen testing center to begin the admissions process into the examination room. Individuals could choose to take the exams during the course of one or more days by taking the test one section at a time with no time limit for completion. There were four sections to the

2014 GED exam: 1) Reasoning Through Language Arts (RLA) (estimated 150 minutes to complete), 2) Mathematical Reasoning (estimated 120 minutes to complete), 3) Science (estimated 90 minutes to complete), and 4) Social Studies (estimated 90 minutes to complete). Examinees received an email alert notifying them when their scores were available to be viewed in their GED account.

Research Questions

This study addressed the following research questions:

1. What relationships, if any, exist between the computer self-efficacy of examinees and participants' performance on their initial section of the computer-based GED exam taken?

2. To what degree, if any, do the following demographic factors affect the interactions between computer self-efficacy and a computer-based GED exam?

    a) age

    b) gender

    c) ethnicity

    d) socio-economic status

3. What challenges do GED examinees experience when taking a GED computer-based exam?

Description of the Population

Ogeechee Technical College serves three counties in southeast Georgia: Bulloch, Evans, and Screven. Of these three counties, Bulloch was the largest with a 2010 reported population of 70,217, according to the United States (U.S.) Census Bureau (2010b). Bulloch County was the home of three post-secondary institutions; according to the U.S. Department of Education's Institute of Education Sciences National Center for

Education Statistics (2014), there were 25,590 students enrolled in post-secondary education institutions during the 2013-2014 school year for the geographical area. East Georgia College had a reported enrollment of 2,857, Georgia Southern University had 20,517 enrolled, and Ogeechee Technical College had 2,216 students enrolled. However, there was still a population who were not attending a post-secondary institution because they had yet to receive a high school diploma or equivalency. According to the 2010 U.S. Census Bureau, there was a reported 22.8% of the population in those three counties who had less than a high school diploma or General Education Development. Like its sister institution, Coastal Pines faced the same daunting statistics as Ogeechee Technical College, and both institutions offered GED preparation courses at no cost to the student (U.S. Census Bureau, 2010a). The U.S. Census Bureau statistics from the 2011-2013 American Community Survey 3-Year Estimates, indicated an approximate 42,000 individuals were under educated.

Coastal Pines Technical College was created due to a merger of two considerably smaller institutions resulting in the combining of 13 counties in the rural southern part of the state and the golden isles area. The service delivery area consisted of Appling, Bacon, Brantley, Camden, Charlton, Clinch, Glynn, Jeff Davis, Long, McIntosh, Pierce, Wayne, and Ware counties, creating a geographically diverse area. Coastal Pines had challenges of its own with a reported 28% of the population having less than a high school diploma or GED. In addition to confronting that reported statistic, Coastal Pines had the challenge of a significantly larger geographic area to serve, increasing the difficult task of reaching out to potential GED examinees.

Using 2010 U.S. Census Bureau data, Table 1 shows the reported percentage of individuals in Georgia, as well as Coastal Pines and Ogeechee Technical College's service delivery area respectively that had less than a high school diploma or equivalency (U.S. Census Bureau, 2010a).

Table 1

Population Percentage with Less than a High School Diploma or Equivalency

Area	Male	Female	Total
Georgia	18.7	13.5	16.2
Coastal Pines Technical College	32.2	23.3	28.0
Ogeechee Technical College	27.2	17.1	22.8
Combined	29.7	20.2	25.4

Note. Data was reported in the 2012 Annual Statistical Report on the GED Test

The GED Testing Service® published the *2012 Annual Statistical Report on the GED Test* in 2013 and reported various candidate demographics, trends across time, and pass rates in all 50 states (2013a). Statistics indicated that in 2012, there were 1,283,830 adults in Georgia without a high school credential. Of the 30,361 candidates who took the GED exam in 2012, 38.8% constituted those between the ages of 19-24. The reported gender ratio of this subject group was 52.7% male and 47.3% female. Likewise, the majority of the candidates reported African American (46.1%) and White (42.6%) as their ethnicity and according to the same report, the highest average grade of completion in Georgia, as reported in 2012, was grade 10.

The Technical College System of Georgia's Office of Adult Education reported monthly the number of GED candidates by testing center with overall graduation numbers. There was a significant decrease of the number of candidates taking the GED exam from 2013 to 2014, possibly due to the redesign of the 2014 GED exam. In fiscal year 2014 (July 1, 2013-June 30, 2014) there were 24,867 test takers with a 75% pass rate, of those 24,867 only 1,085 graduated with the 2014 GED version. According to the Georgia Adult Learners Information System (GALIS), Ogeechee Technical College had 735 students registered for the adult literacy program in spring of 2014 (Technical College System of Georgia, 2014b). The gender statistics of these students indicated that 46.3% were male and 53.7% were female compared to that of the State of Georgia which recorded 45% male and 55% female in enrollment. In addition, Figure 1 shows the age range and Figure 2 shows ethnicity from the GALIS database comparing Ogeechee Technical College with that of the State of Georgia for 2014. These figures indicate that

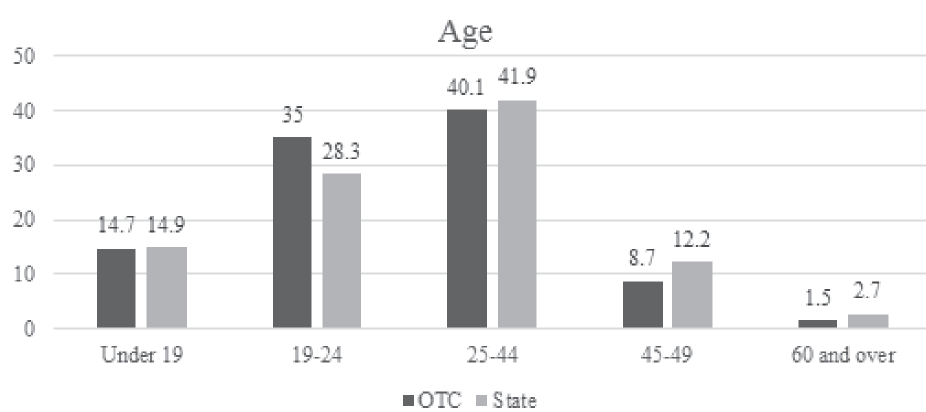

Figure 2. Percentage of students enrolled in 2014 by age group into adult education programs at Ogeechee Technical College (OTC) and for the State of Georgia.

the geographical research area is representative of the statewide population in Georgia. The Asian population in the Ogeechee Technical College's service delivery area is significantly higher than that of the state of Georgia due to employment at a local poultry plant. While a small percentage (7.8%) of this population attended adult literacy classes in 2014 for English as a Second Language (ESOL), there had been no reports of an individual taking a GED exam (Technical College System of Georgia, 2014b).

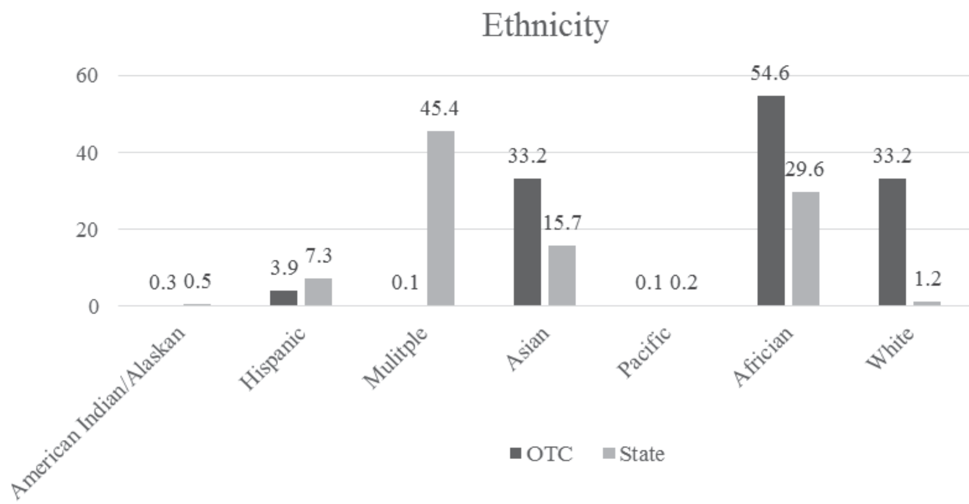

Figure 3. Percentage of students enrolled in 2014 by ethnic group into adult education programs at Ogeechee Technical College (OTC) and for the State of Georgia.

Sample

G*Power, a program used to compute statistical power analyses, determined that a minimum of 100 participant surveys would be needed for the study to ensure an appropriate representation for generalizability. The sample size was determined based on using an analysis of variance (ANOVA) test. The $\alpha = 0.05$ and the $\beta = .95$ with an effect size of .25 (Faul, Erdfelder, Lang, & Buchner, 2007).

GED examinees consisted of individuals who enrolled in an official GED preparatory program or who opted to take the exam without any formal preparation. The target sample of 100 included first time GED examinees who had not taken the exam on either the 2002 computer-based version or the 2014 series exam which was only administered on computer.

All examinees who elected to take the GED exam at Ogeechee Technical or Coastal Pines Technical College assessment centers were asked to participate in the survey process upon completion of their exam. The examinees were only asked to complete the survey once and only if they were coded as a first-time test taker in the Pearson Vue Admissions Manager program. If the examinee met the criteria for an interview, the examinee was asked to voluntarily participate, upon completion of their survey, in an interview with the researcher. Data collection occurred until sufficient information had been collected.

Research Method and Design

The research study was designed as a convergent parallel mixed methods approach that compared qualitative and quantitative data to determine if a meaningful relationship between computer self-efficacy and performance on the computer-based GED exam existed. In addition, demographic variables were gathered to further examine if any relationships existed between age, gender, ethnicity, or socio-economic status and GED exam performance. Qualitative data provided insight into the examinees' personal feelings, emotions, attitudes, and perceptions regarding their experience with the computer-based GED exam. The qualitative data were used to enhance the findings of the quantitative data and allowed for an opportunity for the voices and concerns of examinees to be reported. Creswell (2009), cited a quote by Morse stating that the purpose of the convergent design is "to obtain different but complementary data on the same topic" (p. 77). According to Creswell

> The intent in using this design is to bring together the differing strengths and non-overlapping weaknesses of quantitative methods (large sample size, trends,

> generalization) with those of qualitative methods (small sample, details, in depth). This design is used when the researcher wants to triangulate the methods by directly comparing and contrasting quantitative statistical results with qualitative findings for corroboration and validation purposes (2009, p. 77).

All GED examinees who elected to take the computer-based GED at Ogeechee Technical College Assessment Center and the GED testing centers at Coastal Pines Testing College were asked to participate in the study. Permission to conduct the study was obtained from Ogeechee Technical College President, Dr. Dawn Cartee and President, Dr. Glenn Deibert of Coastal Pines Technical College. There were three avenues of data collection which included: 1) the Computer Self-Efficacy Scale for Adults (CSESA) survey instrument, 2) the test scores gathered from the Technical College System of Georgia (TCSG) Navigator database, and 3) interviews with GED examinees to gain insight into their computer self-efficacy levels.

Independent Variables

A list of the following independent categorical variables was used in the research study. Examinee gender was measured as a dichotomous variable with an option of either male or female. Age was measured, to coincide with GALIS data collection measures, as a continuous variable by asking the participants their age on the Computer Self-Efficacy Scale for Adults (CSESA) survey instrument. Ethnicity was measured as a categorical variable and identifiable by the following options: African American, American Indian/Alaskan, Asian, Hispanic, Pacific, White, or multiple. In addition, socioeconomic status was measured as a categorical range that used the following ranges: less than $24,999, $25,000-$49,999, $50,000-$74,999, and $75,000 or more.

The Computer Self-Efficacy Scale for Adults was used to measure computer self-efficacy among adult GED examinees. All questions on the CSESA were ordinal variables with the following choices: 1) I completely agree, 2) I mostly agree, 3) I somewhat agree, 4) I somewhat disagree, 5) I mostly disagree, and 6) I completely disagree. Brown (2007) estimated that the survey should take approximately 15 minutes to complete.

Dependent Variable

The dependent variable in this study was the examinees' scores on the section of the 2014 series of the computer based GED exam taken. The study used the continuous interval variable of scores from examinees who took the exam at the Ogeechee Technical College Assessment Center and Coastal Pines Technical College. According to the GED Testing Service, the GED exam required a passing score of 150 on each test section (2014a). An examinee would need to have a score of at least 150 on each part and have successfully passed all four sections in order to receive your GED credential. Below Passing would be considered a score of 100 – 149 and a Passing Score would require a 150 – 169 (www.ged.com). Retest score data was not within the scope of this research study and was not collected.

Data Collection Procedures

Data were collected using a voluntarily self-selected sample of first-time computer-based GED examinees. Upon arrival at the assessment center, individuals were admitted into the testing room, using Pearson Vue rules for processing candidates (see Appendix E). Upon completion of their exam session, first-time computer-based GED examinees were given an opportunity to complete the CSESA survey and were asked to participate in a voluntary interview with the researcher or designee. Responses to items were coded as follows: I completely agree = 1, I mostly agree = 2, I somewhat agree = 3, I somewhat disagree = 4, I mostly disagree = 5, and I completely disagree = 6. The CSESA had 12 questions that measured the efficacy levels of hardware usage, 12 that measured the efficacy level of software usage, and 12 that measured the efficacy level of Internet usage. The computer-based skills required to take the GED exam, in addition to the ability to use a mouse, include: scrolling, drag-and-drop between charts and tables, navigation between tabs and passages, typing short answer and extended responses, basic word processing tools, and the ability to use a virtual calculator (Lipke & Farrell, 2013). Appendix G shows the subset areas with the respective questions along with the number of responses, mean computer self-efficacy score, and standard deviation. The Pearson Vue Admissions Manager was used to indicate if the individual was a first-time test taker for the 2014 series. In order to determine if the individual had attempted a section of the 2002 version of the GED on computer, a question was added to the CSESA requesting that information.

Qualitative data from interviews were collected by the researcher once they have completed the Computer Self-Efficacy Scale for Adults. To ensure a consistent delivery of interviews the researcher used Creswell's (2012) guidelines for interview protocols as identified in *Qualitative Inquiry and Research Design: Choosing Among Five Approaches.*

Instrumentation

There were three instruments used for the collection of data: 1) the Computer Self-Efficacy Scale for Adults (CSESA) survey instrument (see Appendix A), 2) GED exam scores, and (3) an interview instrument to gain insight into their computer self-efficacy levels.

The Computer Self-Efficacy Scale for Adults (CSESA), created by James H. Brown (2008), was used to determine examinees' computer self-efficacy. "The reliability and discrimination analysis for the CSESA Instrument (see Appendix A) indicates that it has a Chronbach alpha coefficient of $\alpha = 0.969$. The three subscales exhibited alpha coefficients as follows: hardware, $\alpha = 0.899$; software, $\alpha = 0.930$; and Internet skills, $\alpha = 0.926$" (Brown, 2008, p. 15).

Due to the differences between adult and younger populations' perceptions of computer skills, the CSESA was developed to capture data based on levels, gender, and ethnicity (Brown, 2008, p. 1). The CSESA survey instrument was previously subjected to analysis with regard to criterion validity and reliability. The Cronbach's alpha coefficient of 0.969 indicated an excellent internal consistency (Brown, 2008, p. 3). The instrument took the examinee approximately 15 minutes to complete and was comprised of 36 items related to computer anxiety, and computer attitudes rated on a five-point Likert-scale with 1 being I completely agree and 5 being I completely disagree (Brown, 2008). See Appendix B for the author's permission to use the survey. The demographics section of the CSESA instrument collected data relevant to gender, age, ethnicity, education level, and knowledge level of computers. Socio-economic status was added to the survey to gather data specific to the research variable. A question was also added to the CSESA asking if the examinee had taken any section of the GED exam, either the 2002 or 2014 version computer-based versions. The researcher used Brown's (2007) administration guidelines for delivery of the survey instrument to the participants. The guidelines were provided to the researcher by Brown through personal communication on August 28, 2013 and are provided in Appendix C.

Test score information was gathered using the Navigator database managed by the Technical College System of Georgia. The 2014 series GED exam was developed in partnership with Pearson Vue and the GED Testing Service® and implemented nationwide in January 2014. The 2014 GED Series Test® is comprised of the following timed sections: 1) Reasoning Through Language Arts, 2) Mathematical Reasoning, 3) Science, and 4) Social Studies and utilized various item types. Scores ranged between 100 and 200 with 150 being the required passing score for all sections.

For the qualitative portion of this study, the researcher used established interview protocols as described in Creswell's guidelines in *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (2012). Interview protocols required the researcher to follow a standard set of rules that were included during the session. The interview instrument (see Appendix D) was validated through expert review by three members of the Adult and Career Education department faculty at Valdosta State University for both formative and summative evaluation. A non-probabilistic and convenience sampling process was used for the interviews. Examinees were qualified as potential interviewees if they had not taken any section of the GED on computer and voluntarily agreed to participant in the survey process.

There was a desire to allow for open discussion between interviewer and interviewee in consideration of personal emotions and feelings related to computer-based testing and computer self-efficacy as it related to concerns surrounding the GED exam. Interviewees were allowed to discuss their concerns, excitement, apprehension, etc. Their discussions were transcribed, analyzed, coded, and interpreted to provide an avenue for a more holistic understanding of individual attitudes and understanding of computer self-efficacy.

Analysis of Data

The following participant data sets was used in the statistical analyses: 1) demographic data, 2) CSESA survey instrument data, 3) GED exam scores, and 4) the outcome of the qualitative interviews.

A one-way analysis of variance (ANOVA) was conducted on Question 1 to determine if any meaningful differences existed between the CSESA results and an examinee's performance on sections of the computer-based GED exam taken. An ANOVA was selected rather than a *t* test because the independent variables had more than two groups, reducing the probability of a Type 1 error. All assumptions were verified prior to conducting an ANOVA to include: 1) the dependent variable was interval or ratio, 2) the scores were normally distributed, and 3) any variances in the populations were homogeneous. A Levene's test for equality of variances was conducted to determine if there was homogeneity of variances. If the result of the *f* test was significant, a post-hoc comparison, using a Tukey test was used to determine if the means were significantly different from each other.

A basic histogram of the distribution of demographic data, in addition to a factorial ANOVA, was used to analyze question two to determine if there were any significant main effects between demographic factors, the interactions between computer self-efficacy, and computer-based section of the GED exam taken and a Tukey post-hoc test was used if necessary.

If significant mean differences were detected, further analysis was conducted to determine where those differences existed using Pearson's correlation coefficient, or Pearson's *r*:

r = .10 to .29 or r = -10 to -.29 small

r = .30 to .49 or r = -.30 to -.49 medium

r = .50 to 1.0 or r = -.50 to -1.0 large

Once the ANOVA tests had been conducted, the effect size was calculated by squaring *r* and using Cohen's *d* suggestions; a determination was made regarding the difference in the relationship between variables (Fields, 2009).

Small = .01

Medium = .09

Large = .25

The interview results were used to address Research Question 3 and to enhance the quantitative findings from a qualitative aspect of research by providing personal feelings, emotions, attitudes, and perceptions regarding the challenges experienced while taking the computer-based GED exam. Due to data saturation, it was recommended that 12 interviews be used to gather data for the qualitative section of the research. Guest, Bunce, and Johnson (2006), conducted an experiment in an attempt to determine theoretical saturation in a purposive sample research. In their research titled, *How Many Interviews Are Enough?*, it was determined that after 12 interviews were analyzed and coded, there reached a point in the analysis that the "variability of code frequency appears to be relatively stable by the twelfth interview as well, and, while it improved as more batches of interviews were added, the rate of increase was small and diminished over time" (Guest, Bunce, & Johnson, 2010, p. 74). Content analysis of the qualitative data from the interviews involved the following process: 1) read each transcript in detail making notes, 2) labeled relevant pieces for words phrases sentences or sections (also referred to as coding), 3) prioritized and categorized codes according to Saldana (2008), and 4) labeled categories and determined which were most relevant to the research study. The goal of this analysis was to discover any themes or patterns, concepts, or insights that existed.

Guided Interview Procotol

The following protocol, developed by Creswell (2012) as identified in *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, was used when conducting interviews with GED examinees.

1. Use a header to record essential information about the project and as a reminder to go over the purpose of the study with interviewee. This heading might also include information about confidentiality and address aspects included in the consent form.
2. Place space between the questions in the protocol form. Recognize that an individual may not always respond directly to the questions being asked. For example, a researcher may ask Question 2, but the interviewee's reponse may be to Question 4. Be prepared to write notes on all of the questions as the interviewee speaks.
3. Memorize the questions and their order to minimize losing eye contact with the participant. Provide appropriate verbal transitions from one question to the next.

4. Write out the closing comments that thank the individual for the interview and request follow-up information, if needed, from him or her (p. 168).

Summary

In this chapter, the overall research design was presented with a description of the population, procedures, and instrumentations used within the study, and possible limitations were identified. The dependent variable set was identified as the tests score data from GED exams; the independent variables were identified as demographic information from examinees and data collected from the CSESA survey. A description of the qualitative data collection instruments, collection procedures, and analysis was presented. These procedures yielded a greater understanding and insight into the relationships between GED test taker computer self-efficacy and their demographic characteristics and test results. These data were then used to determine if relationships existed between dependent and independent variables and how qualitative data were coded and used to enhance statistical data. The findings of this study led to recommendations for policy and practice of GED test preparation programs.

Chapter IV

DATA ANALYSES AND RESULTS

Introduction

The Computer Self-Efficacy Scale for Adults (CSESA) Survey was administered to General Education Development (GED) examinees in an effort to obtain perceptions of their computer self-efficacy and any concerns they had regarding computer-based GED testing. In addition, interviews with examinees was used to better understand perceptual data and to place the quantitative data into context. Within each of the following sections the data are presented that led to the findings of this study. Chapter 4 is organized in the following manner: 1) Participant Information and 2) Research Results.

The following research questions were used to guide this study:

1. What relationships, if any, exist between the computer self-efficacy of examinees and participants' performance on their initial section of the computer-based GED exam taken?

2. To what degree, if any, do the following demographic factors affect the interactions between computer self-efficacy and a computer-based GED exam?

    a) age

    b) gender

    c) ethnicity

d) socio-economic status

3. What challenges do GED examinees experience when taking a GED computer-based exam?

Pre-analysis data screening was conducted prior to statistical analysis to identify any coding errors, missing data, and outliers. The study included 100 examinees who came into the centers to take a section of the computer-based GED for the first time and voluntarily agreed to participate by completing the Computer Self-Efficacy Scale for Adults (CSESA) Survey. In addition, there were 15 participants who agreed to participate in a brief interview with the researcher. There were no missing data and all 100 surveys were used in the data analysis process. Using G*Power, a program used to compute statistical power analyses, it was determined that for an ANOVA, a minimum of 100 participant surveys would be an adequate size for the research project, where $\alpha = 0.05$ and the $\beta = .95$ with an effect size of .25 (Faul, Erdfelder, Lang, & Buchner, 2007).

Representativeness of Sample

Participant Characteristics

The Georgia Adult Learning Information System (GALIS) data were used as a standardized tool against which to compare the research outcomes. The GALIS data used in this research reflected the demographics of individuals enrolled in GED programs throughout the state. Table 2 indicates the representation of the demographics from those who participated in the CSESA survey. The average age of those surveyed was 21.67, and the range included a minimum age of 17 and a maximum age of 48. The Georgia Adult Learning Information System reported in fiscal year 2014 that 53% of the students enrolled in the region were younger than 24 years of age. This result is reflective of the average age of 21.67 years for the sample and indicative of the population served by the GED testing program (see Table 2).

Of the participants who completed the CSESA survey 43% were males and 57% were females. This gender demographic was reflective of the Georgia Adult Learning Information System (GALIS) data from 2014 in which 44% of the enrollees were male and 56% were female.

The majority of those surveyed were White (70%) and 19% were African American. Georgia Adult Learning Information System (GALIS) reported that 39% of the enrollees in the regional area were African American and 49% were White. In one particular geographical area of the study, the representation of the Asian population enrolled in a GED program was 7.2%, however only .03% were representative of the region. There is a processing plant in one of the counties represented in this study that, in 2006, began recruiting Korean immigrants for employment which could explain a larger than expected reported Asian population. Of the remainder of the ethnicities represented in the research, 4% of those who participated in the research were Hispanic (see Table 2).

The following information was not provided on GALIS reports but was captured through the survey in an attempt to better understand the demographics of the study participants. Of the participants, the lowest grade reported to have attended was eighth grade (7%) and the highest level attended was 12 (18%). The grade with the highest percentage completed was reported to be eleventh grade at 37% (see Table 2).

When asked how the participants rated their current level of computer skills and knowledge about computers, the following was reported: Low (Beginner) 3%, Intermediate (Average) 79%, and High (Advanced) 18% (see Table 2). The vast majority of those surveyed indicated they had positive perceptions regarding the computer skills.

The majority (68%) of those surveyed indicated a household income of < $24,999 and another 25% reported their annual income between $25,000-49,999. Seven cases reported having an income of > $50,000 (see Table 2).

Overall, the data collected for representation of the demographics for this research study reflected that of the region and can be considered mostly generalizable to the overall population. Using GALIS information allowed for a dataset in which to compare research findings from this study. It was observed that the average age, as well as gender was a reflection of the population studied according to data reported in GALIS. The average of the population surveyed was 21.67 years of age and GALIS data showed that 53% of the enrollment for the area was under the age of 24. Likewise, there were 43 males and 57 females and GALIS data indicated an enrollment of 44% males and 56% females. There was a difference in the ethnicity of those surveyed in comparison to that reported in the Georgia Adult Learning Information System. The study captured surveys from those reporting their ethnicity as White (70%) and African American (19%), whereas GALIS showed those enrolled in the adult program as White (49%) and African American (39%). In addition, although there was a reported 7.2% of enrolled among the Asian population, only .03% was included in the research study which does not reflect the population enrolled in the adult education program.

Table 2

Demographics of CSESA Survey Respondents

Total count	100
Average age	21.67
Gender	
Male	43
Female	57
Ethnicity	
African-American	19
American Indian/Alaskan	2
Asian	3
Hispanic	4
Pacific	0
White	70
Multiple	2
Highest Education Level	
8th grade	7
9th grade	16
10th grade	22
11th grade	37
12th grade	18
Current Computer Skill	
Low (Beginner)	3
Intermediate (Average)	79
High (Advanced)	18
Annual Household Income	
Less than $24,999	68
$25,000-$49,999	25
$50,000-$74,999	2
$75,000 or more	5

Interestingly, of those surveyed, 80% reported they felt they had an average or advanced level of computer skills, which is also indicated through the reported GED test scores. Of those 100 surveyed, the majority (55%) reported attending at least the eleventh or twelfth grade. The majority (68%) reported a household income of < $24,999 with only a few cases who identified an income of more that > $50,000. This information, along with computer self-efficacy and the last high school grade level attended was not captured in GALIS and for the purpose of this study these data were used to describe the population served for GED testing in this study.

Computer Self-Efficacy Survey for Adults and GED Exam Results

The quantitative analyses for Research Questions 1 and 2 was based solely on data gathered from the CSESA Survey and the participants' scores for the section of the GED exam taken. The exam score data were obtained by the researcher from the Technical College System of Georgia's Navigator database. A score of 150 or higher was considered a passing score for each of the four sections of the GED exam; Table 3 indicates that the mean for all sections was above that passing score requirement. It should be noted that only two of the participants took all four sections of the exam during their initial testing session. All other participants took one to three sections of the exam. Scores ranged from 105 as a minimum to 173 as a maximum depending on the section taken. Descriptive statistics analyses were conducted on the exam scores to determine the number of scores reported, minimum and maximum scores on each section, the mean, and standard deviation and are presented in Table 3.

Table 3

Descriptive Statistics for GED Exam Section Taken

Groups	*N*	*M*	*SD*	*Minimum*	*Maximum*
Reasoning Through Language Arts Score	60	154.67	7.97	135	170
Social Studies Score	36	153.89	12.14	105	173
Science Score	31	153.23	6.61	143	170
Mathematical Reasoning Score	29	151.59	8.27	134	168

The survey participants completed a 36-item questionnaire which consisted of statements representing their perceived level of computer self-efficacy. This six-point Likert-type scale was created by James H. Brown in 2007, and a pilot study was implemented that same year to ensure content validity and reliability of the instrument. For this research study the Computer Self-Efficacy Scale for Adults (CSESA) was scored by adding the value of each question. Lower scores indicated a stronger sense of efficacy and higher scores indicated little or no sense of efficacy. The 36 items were used in a data computation to determine the mean which resulted in a self-efficacy score that ranged from a minimum score of 36 which represented the highest level of efficacy to a maximum score of 216 that represented the lowest level of efficacy for an overall efficacy score. The lower an individual's overall self-efficacy score, the higher his or her perceived computer skills. Responses to items were coded as follows: I completely agree = 1, I mostly agree = 2, I somewhat agree = 3, I somewhat disagree = 4, I mostly disagree = 5, and I completely disagree = 6. The CSESA had 12 questions that measured the efficacy levels of hardware usage, 12 that measured the efficacy level of software usage, and 12 that measured the efficacy level of internet usage.

Inferential Findings

Detection of Outliers

To ensure the validity of the data analysis, outliers were addressed. Participants' computer self-efficacy scores was sorted and coded into the following three groups based on the standard deviation of overall efficacy scores: 36-57, 58-80, and 81-129. In addition, these groupings ensured there were adequate representation in each group to provide sufficient numbers for data analysis. A histogram with outliers was conducted on each group and results were compared to the upper and lower boundaries to determine if any outliers existed. Extreme values were identified using the outlier labeling technique created by Hoaglin, Iglewicz, and Tukey (1986). The ranges were determined using the 25th percentile (Q1) and the 75th percentile (Q3). The upper level boundary can be determined by (Q3 + (2.2 X (Q3 – Q1)) and the lower range can be determined using (Q1 - (2.2 X (Q3 – Q1)). One outlier was found in the Reasoning Through Language Arts group but only deviated from the upper limit by .02 and was considered to have minimal effect on the results; therefore, the outlier was included in the dataset. The outlier in the Social Studies group was considered to be a potential threat to the data analysis and was addressed by analyzing the data with and without the outlier as indicated in Table 4. There were no outliers determined for the Science nor Mathematical Reasoning sections of the exam.

Table 4

Potential Outliers Based on Outlier Labeling Technique

Exam	Score	Desired range
Reasoning Through Language Arts	170	141.2 - 169.8
Social Studies	105	115.5 - 195.2

Assumptions

To answer each of the research questions, several sets of assumptions had to be met. The following assumptions were met prior to analyzing the data: the dependent variable, exam scores, were continuous variables and the independent variable, computer efficacy score, was treated as categorical and was created from the average of the scores from the Likert-style Computer Self-Efficacy Scale for Adults Survey. A Shapiro-Wilks test was performed on each ANOVA. All data produced results indicating the p value was above the alpha .05 allowing for the assumption that the groups were normally distributed for each category. However, with a p value lower than the alpha (.000 < .05), the Social Studies scores and the 36-57 group, which consisted of 24 participants, was an exception therefore the null hypothesis was rejected. Upon examination of the data it can be deduced that this group was significantly different from a normal distribution. The Levene's Test for Equality of Variances was performed on each ANOVA and results from each test concluded that the assumption of homogeneity of variance was met and that there was not a significant difference between the group's variances. In addition to ensuring all assumptions were met for the ANOVA, the same process was followed prior to analyzing the data for a Pearson's r correlation coefficient. In this case, all dependent variables were continuous and the independent variable, was treated as a continuous variable.

Relationship Between CSESA and GED Exam Results

Research Question 1 was used to determine if any relationship existed between computer self-efficacy and GED exam results. An analysis of variance (ANOVA) was used to address the research question with the exam score serving as the dependent variable and the participants' computer self-efficacy score as the independent variable.

Research Question 1: What relationships, if any, exist between the computer self-efficacy of examinees and participants' performance on their initial section of the computer-based GED exam taken?

Results indicated there was a statistically significant variance between the Reasoning Through Language Arts exam results and participants' computer self-efficacy scores as well as the Science exam results and participants' computer self-efficacy scores. A correlation coefficient was used as a follow-up to significant findings in an attempt to better understand the statistical significance which resulted from the analysis of variance. The findings for research question one included:

Reasoning Through Language Arts ANOVA Finding: There was a statistically significant relationship between the Reasoning Through Language Arts exam scores and a participant's computer self-efficacy score.

Social Studies ANOVA Finding: There was not a statistically significant relationship between the Social Studies exam scores and a participant's computer self-efficacy score.

Science ANOVA Finding: There was a statistically significant relationship between the Science exam scores and a participant's computer self-efficacy score.

Mathematical Reasoning ANOVA Finding: There was not a statistically significant relationship between the Mathematical Reasoning exam scores and a participant's computer self-efficacy score.

Reasoning Through Language Arts ANOVA Finding: There was a statistically significant relationship between the Reasoning Through Language Arts exam scores and a participant's computer self-efficacy score. An ANOVA was conducted for this research question resulting in the identification of a statistically significant relationship between the Reasoning Through Language Arts exam scores and an individual's computer self-efficacy score. For the participants who had a Reasoning Through Language Arts Reasoning Through Language Arts score, ANOVA results showed that there was a statistically significant difference between the Reasoning Through Language Arts score and an individual's computer self-efficacy score, $F(2,57) = 3.59$, $p = .034$ because the value was less than the alpha of .05 ($p > .05$) (see Table 5). In an attempt to better understand the relationship, a correlation analysis was also conducted resulting in an inverse negative relationship between variables. Descriptive statistics conducted on the Reasoning Through Language Arts group of 60 participants indicated the average mean score was 154.67 with a standard deviation of 7.97. For the Reasoning Through Language Arts Score variable the F value for the Levene's test was 1.25 with a non-significant p value of .292. Because the value was greater than the alpha of .05 ($p > .05$), it was concluded that the assumption of homogeneity of variance was met and that there was not a significant difference between the group's variances. Table 5 shows the

ANOVA results for the Reasoning Through Language Arts score and computer self-efficacy scores.

Table 5

ANOVA Summary for Reasoning Through Language Arts Scores

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	419.599	2	209.799	3.589	.034
Within Groups	3331.735	57	58.451		
Total	3751.333	59			

A correlation analysis was conducted in an attempt to better understand the statistical significance between the Reasoning Through Language Arts scores and individuals' computer self-efficacy score and to determine if there was a correlation due to chance or if an actual relationship existed. A correlation determines the strength of the relationship between two variables; in a negative correlation the variables move in opposite directions. As one variable increases, the other variable decreases, likewise, as one variable decreases, the other variable increases. It can be inferred from the Pearson's r results that there was a moderate inverse relationship between the Reasoning Through Language Arts score and the computer self-efficacy score, $r = -.254$, $p = .050$. According to the two-tailed p value of .05, a statistically significant correlation existed between the two variables. However, upon examination of the data in the scatterplot (Figure 4) there was difficulty in determining if a straight linear relationship existed. Analysis of the data suggested that the negative r value indicated individuals with lower computer efficacy scores generated higher exam scores.

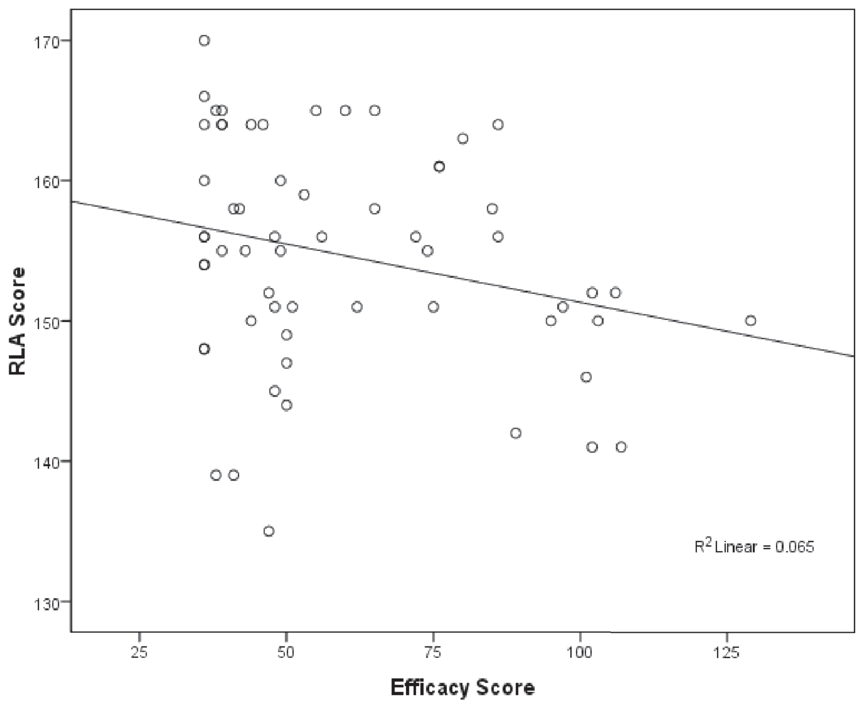

Figure 4. Relationship between scores on the Reasoning Through Language Arts exam and Computer Self-Efficacy Score taken by 60 examinees. Pearson's r = -.254.

Interpretation of Reasoning Through Language Arts ANOVA Finding. The Reasoning Through Language Arts group represented the largest of the four groups with 60 participants. The results of the ANOVA showed statistical significant variance, between individuals' exam scores and their computer self-efficacy score. Since the *p* value was < .05 there was evidence to conclude that an examinees computer self-efficacy affected their Reasoning Through Language exam scores. The analysis of the data indicated a negative correlation showing that individuals with a lower computer efficacy score had better exam scores. To add additional credibility to the ANOVA, it can be inferred from the results of the scatterplot that there appeared to be a relationship, but because few points were close to the linear line of regression, the relationship was weak. In addition, an examination of the group means indicated that those individuals who took the Reasoning Through Language Arts exam (*M* = 154.67, *SD* = 7.97) performed slightly higher than on the other sections of the GED exam (see Table 3).

Social Studies ANOVA Finding: There was not a statistically significant relationship between the Social Studies exam scores and a participant's computer self-efficacy score. Descriptive statistics conducted on the Social Studies group of 36 participants indicated the average mean score was 153.89 with a standard deviation of 12.144. For the Social Studies Score variable the F value for the Levene's test was .249 with a non-significant *p* value of .781. Because the value was more than the alpha of .05 ($p > .05$), it was concluded that the assumption of homogeneity of variance was met and that there was not a significant difference between the group's variances. Table 6 shows the ANOVA results for the Social Studies and computer self-efficacy scores. For the participants who had a Social Studies score the results from the analysis of variance showed that there was no statistically significant difference between the Social Studies score and an individual's computer self-efficacy score, $F(2,33) = .66$, $p = .522$ because the value was greater than the alpha of .05 ($p > .05$).

Table 6

ANOVA Summary for Social Studies Scores

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	199.594	2	99.797	.664	.522
Within Groups	4961.962	33	150.362		
Total	5161.556	35			

Due to this group having an outlier (105 Social Studies exam score) the data set was analyzed with the removal of the outlier (Table 7). It was determined from the analysis of the data that the removal did generate a more normally distributed group with a *p* value, p = .522. The ANOVA analysis remained non-significant, F (2,32) = 2.655, p = .086. There was a *p* value difference of .436 which could suggest that the inclusion of the outlier skewed the data, although the non-significant result remained the same. The F value for the Levene's test was .008 with a non-significant *p* value of .086. Because the value was more than the alpha of .05 (p > .05), it was concluded that the assumption of homogeneity of variance was met and that there was not a significant difference between the group's variances.

Table 7

ANOVA Summary for Social Studies Scores without outlier

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	384.775	2	192.388	2.655	.086
Within Groups	2318.368	32	72.449		
Total	2703.143	34			

Interpretation of Social Studies ANOVA Finding. The findings from the ANOVA output was that there was no statistical significance between individuals' Social Studies exam scores and their computer self-efficacy score, F (2, 33) = .66, p = .522. Because the *p* value was > .05 there was weak evidence to conclude that there might be a relationship between examinees' computer self-efficacy and their Social Studies exam scores. The group did include an outlier of 105 and was removed from the dataset for the ANOVA because it was suggested that the removal of the outlier would create a more normally distributed group. The removal of the outlier did allow for a considerably weaker *p* value or relationship between the variables, however removal did not affect the overall conclusion of no statistical significance.

Science ANOVA Finding: There was a statistically significant relationship between the Science exam scores and a participant's computer self-efficacy score. Descriptive statistics conducted on the Science group of 31 participants indicated the average mean score was 153.23 with a standard deviation of 6.612. For the Science Score variable the F value for the Levene's test was 1.187 with a non-significant *p* value of .320. Because the value was greater than the alpha of .05 ($p > .05$), it was concluded that the assumption of homogeneity of variance was met and that there was not a significant difference between the group's variances. Table 8 shows the ANOVA results for the Science score and computer self-efficacy scores. For the participants who had a Science score the results of an analysis of variance showed that there was a statistically significant difference between the Science Score and an individual's computer self-efficacy score, $F(2,28) = 3.45$, $p = .046$ because the value was less than the alpha of .05

Table 8

ANOVA Summary for Science Scores

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	259.300	2	129.650	3.450	.046
Within Groups	1052.119	28	37.576		
Total	1311.419	30			

($p > .05$).

A correlation coefficient was also conducted for these two variables in an attempt to better understand the statistical significance between the Science scores and individuals' computer self-efficacy score and to determine if there was a correlation due to chance or if an actual relationship existed. It can be inferred from the Pearson's *r* data results that there was a moderate inverse relationship between the Science score and the computer self-efficacy score, *r* = -.426, *p* = .017. An inference can be made from the two-tailed test with a *p* value of .017 that there was a statistically significant correlation that existed between the two variables. The scatter plot in Figure 5 represents the Science score and computer self-efficacy score. It was clear from the scatter plot that the data did not produce a linear correlation which was contrary to what the relationship of the Pearson's *r* of -.426 would propose. Similar to the results of the Reasoning Through Language Arts data, the negative *r* value indicated that individuals with lower computer efficacy scores generated higher exam scores.

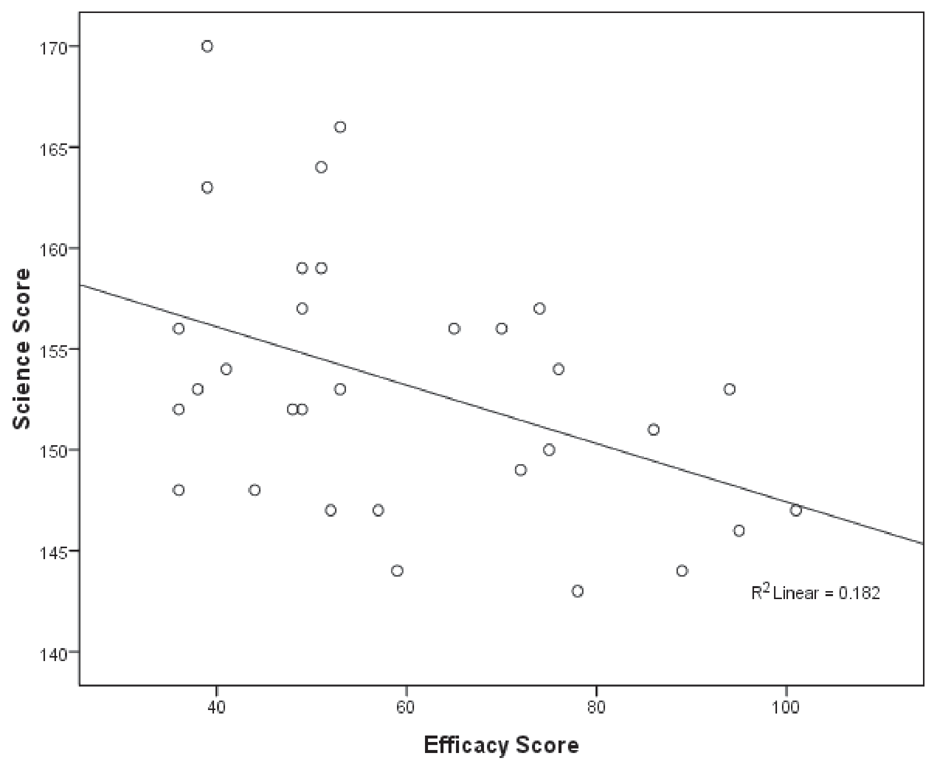

Figure 5. Relationship between scores on the Science exam and Computer Self-Efficacy Score taken by 30 examinees. Pearson's r = -.426.

Interpretation of Science ANOVA Finding. The Science group was represented with 30 participants. The ANOVA results showed statistical significance, between individuals' exam scores and their computer self-efficacy score, F (2, 28) = .3.45, p =

.046. Since the *p* value was < .05 there was evidence to conclude that an examinees computer self-efficacy affected their Science exam scores. The results from the analysis of the data indicated a negative correlation showing that individuals with a lower computer efficacy score tended to generate a higher exam score. In addition, it can be observed from the results of the scatterplot that there appeared to be a weak relationship, because few points were close to the linear line of regression. In addition, the ANOVA *p* value of .046 confirmed that although a relationship appeared to have existed it was also suggestive of a weak relationship.

Mathematical Reasoning ANOVA Finding: There was not a statistically significant relationship between the Mathematical Reasoning exam scores and a participant's computer self-efficacy score. Descriptive statistics conducted on the Mathematical Reasoning group of 29 participants indicated the average mean score was 151.59 with a standard deviation of 8.279. For the Mathematical Reasoning score variable the F value for the Levene's test was .248 with a non-significant *p* value of .782. Because the value was greater than the alpha of .05 ($p > .05$), it was concluded that the assumption of homogeneity of variance was met and that there was not a significant difference between the group's variances. Table 9 shows the ANOVA results for the Mathematical Reasoning score and computer self-efficacy scores. For the participants who had a Mathematical Reasoning score an analysis of variance showed that there was not a statistically significant difference between the Mathematical Reasoning score and an individual's computer self-efficacy score, $F(2,26) = 1.84$, $p = .179$ because the value was greater than the alpha of .05 ($p > .05$).

Table 9

ANOVA Summary for Mathematical Reasoning Scores

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	238.025	2	119.012	1.841	.179
Within Groups	1681.010	26	64.654		
Total	1919.034	28			

Interpretation of Mathematical Reasoning ANOVA Finding. The Mathematical Reasoning group represented the smallest of the four groups with 29 participants. The ANOVA results showed no statistical significance between individuals' exam scores and their computer self-efficacy score, F (2,26) = .1.84, p = .179. The *p* value was > .05 and there was no evidence to conclude that an examinees computer self-efficacy affected their Mathematical Reasoning exam scores.

Findings indicated that individuals with higher Reasoning Through Language test scores had a higher sense of computer self-efficacy that resulted in a mean score of 154.67 which was above the required passing score of 150. Overall, no significant relationship was found from the ANOVA when comparing the Social Studies exam scores and the computer self-efficacy levels of the individuals. However, the *p* value did indicate weak evidence to suggest that a relationship could exist p = .522. Overall, individuals who scored higher on the Science exam reported having a higher sense of computer self-efficacy; this was consistent with the overall passing score. The ANOVA results indicated no relationship existed between those who tested in Mathematical Reasoning and their sense of computer self-efficacy.

Findings From Factorial Analysis of Variance (ANOVA)

The same Computer Self-Efficacy Scale for Adults survey instrument was used to address the second question of this study to determine if any relationship existed between the examinees computer self-efficacy, the section of the GED exam taken, and the demographics: age, gender, ethnicity, and socio-economic status.

Research Question 2: To what degree, if any, do the following demographic factors affect the interactions between computer self-efficacy and computer-based GED exam?

Assumptions

Prior to analyzing data for the factorial ANOVA process, the following assumptions were met: the independent variables, age, gender, ethnicity, socio-economic status, and computer self-efficacy were all categorical variables; the dependent variable, exam scores of GED section taken, was treated as interval data. In addition, an independent convenience sampling of the population was observed during data collection. A Shapiro-Wilks test was performed prior to conducting ANOVAs and results indicated a $p = < .05$ allowing for the assumption that all groups were normally distributed. Conducting factorial ANOVAs was crucial to the research study in order to provide information regarding interaction effects between the independent variables and the dependent variables. With a relatively small sample size of 100 examinees and five independent variables with two or more levels each, factorial ANOVA tests posed a problem by causing violations to the Levene's Test for Equality of Variances. A Levene's Test for Equality of Variances was performed on each factorial ANOVA and the results from each test concluded that the assumption of homogeneity of variance was met and that there was not a significant difference between the group's variances in all but three interactions (gender on computer self-efficacy when controlled for by Reasoning Through Language Arts score $p = .037$, ethnicity on computer self-efficacy when controlled for by Social Studies scores $p = .018$, and gender on computer self-efficacy when controlled for by Science scores $p = .042$). For these violations, one way ANOVA tests were conducted on each interaction and all but one passed the Levene's Test for Equality of Variances; Social Studies exams scores when compared with ethnicity failed to reject the null hypothesis at $p = .028$.

Relationship Between Demographics, CSESA, and GED Scores

Research question two examined to what degree, if any, the demographic factors age, gender, ethnicity, and socio-economic status have on the interactions between computer self-efficacy and computer-based GED exam. A factorial analysis of variance (ANOVA) test was conducted with the dependent variable GED exam scores on section taken (Reasoning Through Language Arts, Social Studies, Science, and Mathematical Reasoning). The independent variables consisted of the demographics: age, gender, ethnicity, and socio-economic status, and computer self-efficacy score. Results indicated that four of the factorial ANOVA tests analyzed on the dependent variable, GED exam score, had one or more statistically significant main effects with results at the $p = < .05$ level and one interaction effect.

Research Question 2: To what degree, if any, do the following demographic factors affect the interactions between computer self-efficacy and computer-based GED exam?

a) age
b) gender

c) ethnicity

d) socio-economic status

Reasoning Through Language Arts Factorial ANOVA Results

A factorial ANOVA was conducted on the dependent variable Reasoning Through Language Arts scores and the independent variables computer self-efficacy scores and age, gender, ethnicity, and socio-economic status respectively (see Appendix H).

Reasoning Through Language Arts Factorial ANOVA Finding on Age and CSE: There were significant relationships on age when comparing Reasoning Through Language Arts exam scores and computer self-efficacy scores.

Reasoning Through Language Arts Factorial ANOVA Finding on Gender and CSE: There were significant relationships on gender when comparing Reasoning Through Language Arts exam scores and computer self-efficacy scores.

Reasoning Through Language Arts Factorial ANOVA Finding on Ethnicity and CSE: There were no significant relationships on ethnicity when comparing Reasoning Through Language Arts exam scores and computer self-efficacy scores.

Reasoning Through Language Arts Factorial ANOVA Finding on SES and CSE: There were significant relationships on socio-economic status when comparing Reasoning Through Language Arts exam scores and computer self-efficacy scores.

Finding for Reasoning Through Language Arts Factorial ANOVA on Age and CSE: There were significant relationships on age when comparing Reasoning Through Language Arts exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare individuals' Reasoning Through Language Arts exam scores with their age and the individuals' computer self-efficacy score. The age categories used in this analysis mirrored that of the Georgia Adult Learning Information System (GALIS) so a comparison could be made for generalizability. The main effect on age was determined to be non-significant: $F(2, 51) = 1.027$, $p = .365$. However, there was a significant main effect on the computer self-efficacy score: $F(2, 51) = 5.05$, $p = .010$. Lastly, the interaction was also not significant: $F(4, 51) = 2.442$, $p = .058$. The main effect on computer self-efficacy score corresponded with a small effect size of $\eta^2 = .138$, which meant that 14% of the variance in the Reasoning Through Language Arts exam scores was predictable from the individual's age. The partial eta-squared value indicated that an examinee's computer self-efficacy score accounted for 16% of the variance in the Reasoning Through Language Arts exam score when all of the other variables were held constant. Examinees who were between the ages of 16-18 ($n = 22$) had a higher mean average on the Reasoning Through Language Arts exam ($M = 159.69$) and a higher reported computer self-efficacy ($M = 149.11$) than those between the ages of 25-44 ($n = 15$) when compared to computer self-efficacy scores, allowing for a significant difference of 10.58 points (see Table 10).

Table 10

Descriptive Statistics for Age and Computer Self-Efficacy Score for Reasoning Through Language Arts Exam Scores

Age Categories	*Computer Self-Efficacy Score*	*N*	*M*	*SD*
Ages 16-18	36-57	13	159.69	5.23
	58-80	5	155.40	4.39
	81-129	4	155.50	6.19
	Grand Mean		157.95	5.42
Ages 19-24	36-57	15	154.87	8.61
	58-80	3	160.33	5.03
	81-129	5	149.40	5.98
	Grand Mean		154.39	8.16
Ages 25-44	36-57	9	149.11	8.44
	58-80	2	164.00	1.41
	81-129	4	146.00	5.83
	Grand Mean		150.27	9.01

An interaction plot revealed individuals between the ages of 19-24 and 25-44 had higher exam scores with moderate computer self-efficacy scores (58-80), whereas examinees who were between the ages of 16-18 had higher exam scores and displayed more computer self-efficacy (36-57). The lines representing the three age groups in the plot were not parallel and implied a main effect existed between computer self-efficacy scores and the age of the examinee. Upon further examination, there appeared to be a small difference in test scores at each interaction when factoring in age (see Figure 6).

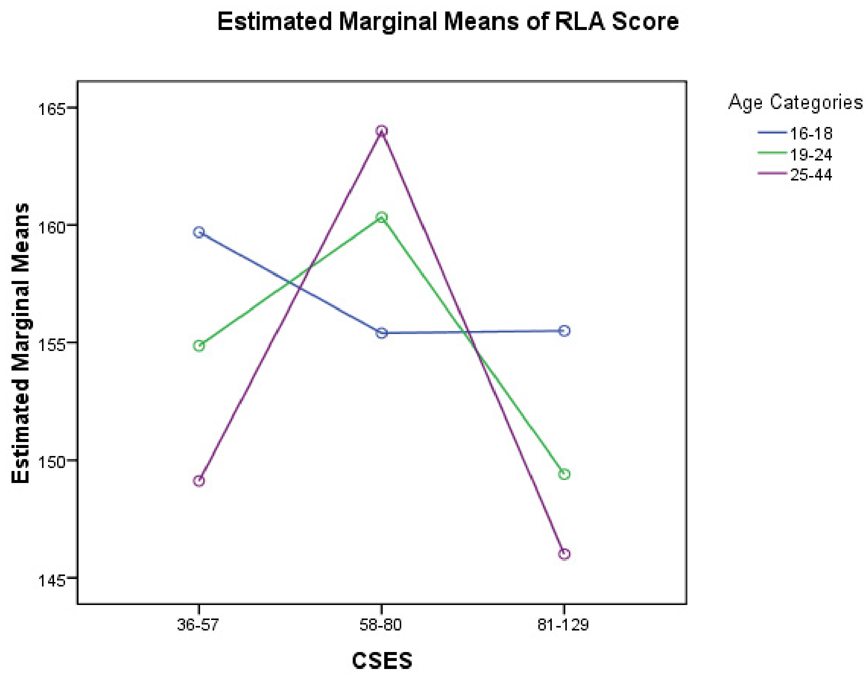

Figure 6. Effects of Age and Computer Self-Efficacy Scores on Reasoning through Language Arts Exam Scores

A Tukey HSD post-hoc test was conducted to determine the nature of the differences between age categories. The results revealed that the age of the examinee did produce an overall statistically significantly higher exam score with 25-44 year olds (*M* = 150.27, *SD* = 9.01) and 16-18 year olds (*M* = 157.95, *SD* = 5.42)

Interpretation of Finding for Reasoning Through Language Arts Factorial ANOVA on Age and CSE. The factorial ANOVA results suggested that there was no main effect on the Reasoning Through Language Arts exams scores when using an examinee's age as the main factor, however there was a significance when using his or her computer self-efficacy scores, F (2, 54) = 3.610, p = .034. Younger examinees who reported being between the ages of 16-18 had higher exam scores for the Reasoning Through Language Arts section of the GED than those who were ages 25-44.

Finding for Reasoning Through Language Arts Factorial ANOVA on Gender and CSE: There were significant relationships on gender when comparing Reasoning Through Language Arts exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare an individual's Reasoning Through Language Arts exam scores with gender and the individual's computer self-efficacy score. The main effect on gender was determined to be non-significant: F (1, 54) = .612, p = .437. The main effect on computer self-efficacy was statistically significantly: F (2, 54) = 3.610, p = .034. Finally, the interaction was also not significant: F (2, 54) = .199, p = .820. The statistically significant main effect on computer self-efficacy scores corresponded with a small effect size of $\eta^2 = .116$, which meant that 12% of the variance in the Reasoning Through Language Arts exam scores was predictable from the computer self-efficacy when considering gender. The partial eta-squared value indicated that a student's computer self-efficacy score accounted for 12% of the variance in the Reasoning Through Language Arts exam scores. Interpretation of the data analysis revealed that both males (n = 20) (M = 159) and females (n = 40) (M = 158.43) with a computer-self efficacy score between 58-80 had higher Reasoning Through Language Arts exam scores. This analysis revealed that individuals with a moderate computer efficacy scores had higher exam scores. Similarly, both males with a mean average of 151 and females (M = 149.57) with lower computer self-efficacy presented lower mean exam scores. This relationship was shown in an 8 point difference for males and an 8.85 difference for females (see Table 11).

Table 11

Descriptive Statistics for Gender and Computer Self-Efficacy Score for Reasoning Through Language Arts Exam Scores

Gender	*Computer Self-Efficacy Score*	*N*	*M*	*SD*
Male	36-57	11	157.82	6.75
	58-80	3	159.00	3.60
	81-129	6	151.00	9.67
	Grand Mean		155.95	7.82
Female	36-57	26	154.04	8.87
	58-80	7	158.43	6.07
	81-129	7	149.57	3.45
	Grand Mean		154.02	8.06

The interaction plot was parallel, implying that there was not an interactive effect between computer self-efficacy scores and the gender of the examinee and was consistent with the relatively minute differences in mean exam scores (see Figure 7).

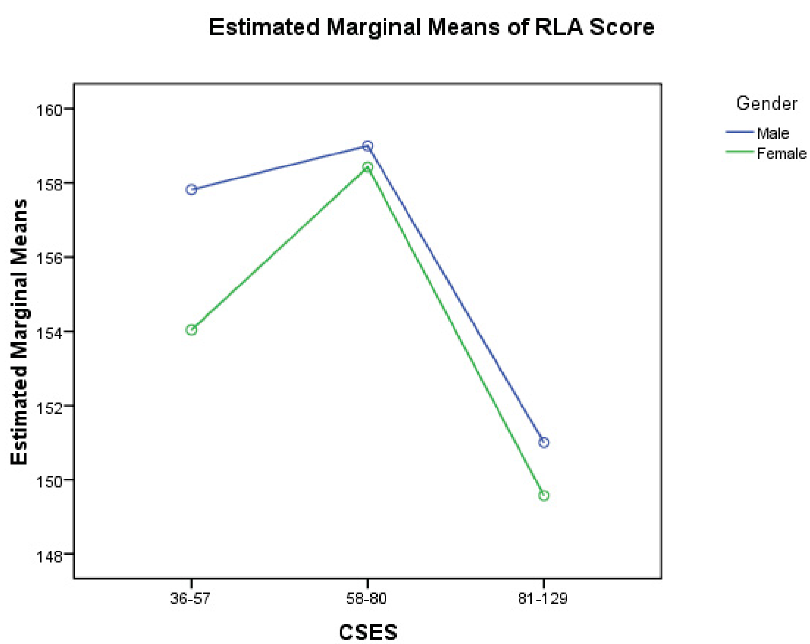

Figure 7. Effects of Gender and Computer Self-Efficacy Scores on Reasoning Through Language Arts Exam Score

Interpretation of Finding for Reasoning Through Language Arts Factorial ANOVA on Gender and CSE. It could be concluded from the factorial ANOVA output that both males and females who took the Reasoning Through Language Arts exam had higher test scores, $F\ (2, 54) = 3.610$, $p = .034$, when reporting a moderate computer self-efficacy score of 58-80. These data revealed that the gender of the individual did not affect the exam scores significantly when both groups reported a computer self-efficacy score of 58-80. Likewise the same applies for those who reported a lower computer self-efficacy score of 81-129 with a slight difference in overall exam scores.

Finding for Reasoning Through Language Arts Factorial ANOVA on Ethnicity and CSE: There were no significant relationships on ethnicity when comparing Reasoning Through Language Arts exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare an individual's Reasoning Through Language Arts exam scores with ethnicity and the individual's computer self-efficacy score. The main effect on ethnicity was determined to be non-significant: $F\ (4, 49) = 1.376$, $p = .256$. The main effect when using the computer self-efficacy score was also not significant: $F\ (2, 49) = 2.082$, $p = .136$. Lastly, the interaction was also not significant: $F\ (4, 49) = 2.198$, $p = .083$.

Interpretation of Finding for Reasoning Through Language Arts Factorial ANOVA on Ethnicity and CSE. From the factorial ANOVA data analysis, the results indicated that the individual's ethnicity nor his or her computer self-efficacy score had any significant effect on Reasoning Through Language Arts exam scores. Because the p values for both main effects and the interaction were > .05 there was no evidence to suggest any relationships existed between the dependent and independent variables.

Finding for Reasoning Through Language Arts Factorial ANOVA on SES and CSE: There were significant relationships on socio-economic status when comparing Reasoning Through Language Arts exam scores and computer self-efficacy scores. The factorial ANOVA results on the main effect of individuals' socio-economic status was not statistically significance: F (3, 52) = .869, p = .463. There was however a statistically significant main effect on the computer self-efficacy score: F (2, 52) = 3.382, p = .042. There was no statistical significant for the interaction: F (2, 52) = 1.103, p = .340. For the significant effect on the computer self-efficacy variable, the effect size of η^2 = .106 remained consistent with a small effect size. The partial eta-squared value of .115 was suggestive of approximately 12% of the variance in students' computer self-efficacy scores and the Reasoning Through Language Arts exam scores could be contributed to their socio-economic status. Of the individuals who reported a household income of < $24,999 and > $75,000, the highest exam scores were found among those with moderate computer self-efficacy scores (58-80). In contrast, those examinees who reported a lower self-efficacy score (81-129) had lower exam scores for each group (see Table 12).

Lines representing the four household income range groups on an interaction plot were not parallel and implied there was an interaction effect between computer self-efficacy scores and the socio-economic status of the examinee. A Tukey's post hoc test could not be performed because at least one group had fewer than two cases.

Table 12

Descriptive Statistics for Socio-Economic Status and Computer Self-Efficacy Score for Reasoning Through Language Arts Exam Scores

Socio-Economic Status Categories	*Computer Self-Efficacy Score*	*N*	*M*	*SD*
< $24,999	36-57	22	154.00	8.012
	58-80	8	157.25	4.979
	81-129	12	151.00	6.424
	Grand Mean		153.76	7.268
$25,000-49,999	36-57	13	156.38	9.403
	81-129	1	141.00	
	Grand Mean		155.29	9.926
$50,000-74,999	58-80	1	163.00	
	Grand Mean		163.00	
< $75,000	36-57	2	160.00	5.657
	58-80	1	165.00	
	Grand Mean		161.57	4.933

Interpretation of Finding for Reasoning Through Language Arts Factorial ANOVA on SES and CSE. The factorial ANOVA results reported a statistically significant main effect on the computer self-efficacy score: $F(2, 52) = 3.382$, $p = .042$. This could suggest that examinees who reported a household income of less than $24,999 and more than $75,000 had the highest exam scores for the Reasoning Through Language Arts section of the GED when reporting a computer self-efficacy score of 58-80. This was consistent with the factorial ANOVA output when controlling for gender on the same section of the GED test. It should be noted, however that there were only three represented in the sample of more than $75,000 reported household income, whereas there were 42 in those who reported less than $24,999. As a result the particular findings for $50,000- $75,000 were relatively weak compared to other data sets which would allow for generalizability. Because there were so few samples in these income ranges and a single outlier could skew the data, it would not be suggested that this interpretation be considered representative of those socio-economic categories.

Overall, there were significant findings on age when comparing examinees Reasoning Through Language Arts and computer self-efficacy scores indicating that those between the ages of 19-24 had a grand mean score of 154.39 and those ages 16-18 had a grand mean score of 157.95 which suggested that the younger the examinees the more likely they were to pass the Reasoning Through Language Arts exam. There were significant relationships that appeared to have existed when comparing gender on Reasoning Through Language Arts and computer self-efficacy scores. In general the grand mean indicated males (M = 155.95) did better on the exam than did females (M = 154.02), although not considerably higher. Both males and females who scored the highest on the Reasoning Through Language Arts reported an average computer self-efficacy score, likewise those with lower computer self-efficacy scores had lower exam scores. There were significant relationships that were found to have existed on the socio-economic status of the examinees when comparing their Reasoning Through Language Arts and computer self-efficacy scores. The overall highest grand means were for those individuals who reported a household income of > $50,000, however there were only three reported cases in that data set resulting in an inability to generalize the findings to the overall population. It appeared that for those who reported a household income of $25,000-49,999 had a higher grand mean (155.29) than those < $24,999 (M = 153.76). However those who scored higher in the lowest socio-economic status category had a reported average computer-self-efficacy whereas those in the 25-50 range scored higher on the Reasoning Through Language Arts exam. No relationship appeared to have existed when comparing ethnicity to Reasoning Through Language Arts scores and the individuals computer self-efficacy scores.

Social Studies Factorial ANOVA Results

A factorial ANOVA was conducted on the dependent variable Social Studies exam scores and the independent variables computer self-efficacy scores and the age, gender, ethnicity, and socio-economic status respectively. Each of the factorial ANOVA tests analyzed on the dependent variable, Social Studies exam scores, had no statistically significant result at the $p = < .05$ level (See Appendix I).

Finding for Social Studies Factorial ANOVA on Age and CSE: There were no significant relationships on age when comparing Social Studies exam scores and computer self-efficacy scores.

Finding for Social Studies Factorial ANOVA on Gender and CSE: There were no significant relationships on gender when comparing Social Studies exam scores and computer self-efficacy scores.

Finding for Social Studies Factorial ANOVA on Ethnicity and CSE: There were no significant relationships on ethnicity when comparing Social Studies exam scores and computer self-efficacy scores.

Finding for Social Studies Factorial ANOVA on SES and CSE: There were no significant relationships on socio-economic status when comparing Social Studies exam scores and computer self-efficacy scores.

Finding for Social Studies Factorial ANOVA on Age and CSE: There were no significant relationships on age when comparing Social Studies exam scores and *computer self-efficacy scores.* A factorial ANOVA was conducted to compare individuals' Social Studies exam scores with their age and the individuals' computer self-efficacy score. The main effect on age was determined to be non-significant: F (2, 28) = .643, p = .533. Likewise, the main effect on the computer self-efficacy score was also non-significant: F (2, 28) = 1.050, p = .363. Lastly, the interaction was also not significant: F (3, 28) = .653, p = .588.

Interpretation of Finding for Social Studies Factorial ANOVA on Age and CSE. The results produced from the factorial ANOVA did not have any statistical significance and the *p* values for both main effects and the interaction were well above the required > .05 which suggested that age nor computer self-efficacy scores had any significant effect on the Social Studies exam scores.

Finding for Social Studies Factorial ANOVA on Gender and CSE: There were no significant relationships on gender when comparing Social Studies exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare individuals' Social Studies exam scores with the examinees' age and computer self-efficacy score. The main effect on gender was non-significant: F (1, 30) = 2.154, p = .153 and the main effect on the computer self-efficacy score was non-significant: F (2, 30) = .801, p = .458. Lastly, the interaction was also not significant: F (2, 30) = .220, p = .804.

Interpretation of Finding for Social Studies Factorial ANOVA on Gender and CSE Results from the factorial ANOVA suggested that an individual's gender nor level of computer self-efficacy had an effect on the Social Studies exam scores. All *p* values for the two main effects and the interaction were > .05 which indicated no evidence to suggest the two independent variables effected the over dependent exam scores.

Finding for Social Studies Factorial ANOVA on Ethnicity and CSE: There were no significant relationships on ethnicity when comparing Social Studies exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare individuals' Social Studies exam scores with the examinees' ethnicity and computer self-efficacy scores. The main effect on ethnicity was non-significant: F (3, 27) = 1.807, p = .170 and the main effect on the computer self-efficacy score was also non-significant: F (2, 27) = .168, p = .846. Lastly, the interaction was also not significant: F (3, 27) = .635, p = .599.

Interpretation of Finding for Social Studies Factorial ANOVA on Ethnicity and CSE. The results from the factorial ANOVA output showed that participants had no significant association to their Social Studies exam or computer self-efficacy scores considering all p values were > .05.

Finding for Social Studies Factorial ANOVA on SES and CSE: There were no significant relationships on socio-economic status when comparing Social Studies exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare individuals' Social Studies exam scores with the examinees' socio-economic status and computer self-efficacy scores. The main effect on socio-economic status was non-significant: F (2, 29) = .448, p = .643 and the main effect on the computer self-efficacy score was also non-significant: F (2, 29) = .1.292, p = .643. Lastly, the interaction was also not significant: F (2, 29) = .784, p = .466.

Interpretation of Finding for Social Studies Factorial ANOVA on SES and CSE. The results from the factorial ANOVA indicated that individuals' socio-economic status nor their reported computer self-efficacy score had any significant effect on their Science exam scores. All of the *p* values for both main effects and the interaction were above the required > .05 which suggested that there was no statistical significance that existed between an individuals' socio-economic status and computer self-efficacy score when compared to their exam scores for the Science section for the GED test.

In conclusion, it was found that when comparing age, gender, ethnicity, and socio-economic status on computer self-efficacy and Social Studies exam scores, that no relationship appeared to have existed. These findings suggested that none of the demographics had an effect on the examinees' tests scores or their sense of computer self-efficacy.

Science Factorial ANOVA Results

A factorial ANOVA was conducted on the dependent variable Science exam scores and the independent variables computer self-efficacy scores and the age, gender, ethnicity, and socio-economic status respectively. There were no significant results when comparing the dependent variable to age or ethnicity but there was significant interaction for gender and both the socio-economic status and the main interaction socio-economic status and computer self-efficacy scores (see Appendix J).

Finding for Science Factorial ANOVA on Age and CSE: There were no significant relationships on age when comparing Science exam scores and computer self-efficacy scores.

Finding for Science Factorial ANOVA on Gender and CSE: There were significant relationships on gender when comparing Science exam scores and computer self-efficacy scores.

Finding for Science Factorial ANOVA on Ethnicity and CSE: There were no significant relationships on ethnicity when comparing Science exam scores and computer self-efficacy scores.

Finding for Science Factorial ANOVA on SES and CSE: There were significant relationships on socio-economic status when comparing Science exam scores and computer self-efficacy scores.

Finding for Science Factorial ANOVA on Age and CSE: There were no significant relationships on age when comparing Science exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare individuals' Science exam scores with their age and individuals' computer self-efficacy score. The main effect on age was determined to be non-significant: F (2, 24) = .564, p = .576. Likewise, the main effect on the computer self-efficacy score was non-significant: F (2, 24) = 3.406, p = .050. Lastly, the interaction was not significant: F (2, 24) = .950, p = .401.

Interpretation of Finding for Science Factorial ANOVA on Age and CSE. From the analysis of the factorial ANOVA, it could be implied that the examinees' age nor their reported computer self-efficacy scores had any significant effect on their Science exam scores. Since the p value was > .05 there was no evidence to reveal relationship existed between examinees computer self-efficacy or their age affected their and Science exam scores.

Finding for Science Factorial ANOVA on Gender and CSE: There were significant relationships on gender when comparing Science exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare individuals' Science exam scores with gender and the individuals' computer self-efficacy scores. The main effect on gender was determined to be non-significant: $F(1, 25) = .399$, $p = .533$. The main effect on computer self-efficacy was statistically significant: $F(2, 25) = 3.675$, $p = .040$. Finally, the interaction was not significant: $F(2, 25) = .311$, $p = .736$. The statistically significant main effect on computer self-efficacy scores corresponded with an almost medium effect size of $\eta^2 = .220$, which meant that 22% of the variance in the Science test scores was predictable from the computer self-efficacy when considering gender. The partial eta-squared value indicated that a student's computer self-efficacy score accounted for 23% of the variance in the Science test scores. Data revealed that both males (M = 158.17) and females (M = 154.25) with a computer-self efficacy score between 36-57 had higher Science test scores which showed that individuals with higher computer efficacy scores had higher test scores. Similarly, both males (n = 12) (M = 149) and females (n = 19) (M = 147.67) with lower computer self-efficacy presented lower mean test scores. This allowed for a 9.17 point difference for males and a 6.58 difference for females (see Table 13).

Table 13

Descriptive Statistics for Gender and Computer Self-Efficacy Score for Science

Gender	*Computer Self-Efficacy Score*	*N*	*M*	*SD*
Male	36-57	6	158.17	8.13
	58-80	4	151.00	6.27
	81-129	2	149.00	2.83
	Grand Mean		154.25	7.67
Female	36-57	12	154.25	5.97
	58-80	4	151.25	5.62
	81-129	3	147.67	4.73
	Grand Mean		152.58	5.98

An interaction plot revealed an interactive effect between males and females when scoring 151 on the Science test and an indicated 58-80 computer self-efficacy score. This interaction suggested that both genders scored the same when indicating the same computer self-efficacy score (see Figure 8). A Tukey HSD post-hoc test was conducted to determine the nature of the difference between genders. The results revealed that the gender of the examinee did not produce an overall statistically significantly higher exam score for the Science exam.

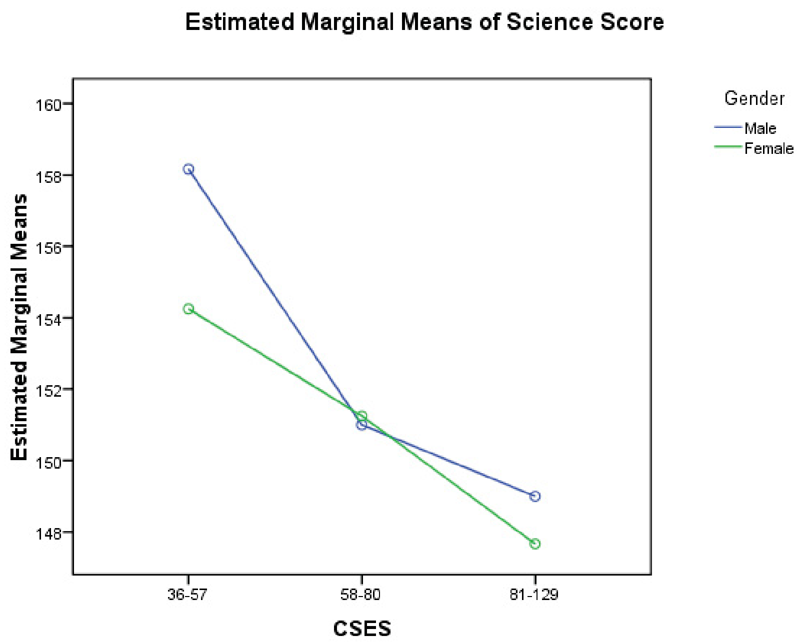

Figure 8. Effects of Gender and Computer Self-Efficacy Scores on Science Scores

Interpretation of Finding for Science Factorial ANOVA on Gender and CSE. The factorial ANOVA analysis showed statistical significance on the main effect for the Science exam scores when controlling for the computer self-efficacy score independent variable, F (2, 25) = 3.675, p = .040. The p value was < .05 and there was evidence to show that there was a relationship between examinees' computer self-efficacy and their Science exam scores. This result was consistent with the findings on the reported ANOVA relationship between Science exam scores and computer self-efficacy scores which were also statistically significant, F (2, 28) = .3.45, p =.046. Although the Tukey HSD results revealed that the gender of the examinee did not produce an overall statistically significantly higher exam score for the Science exam, there was an interaction on the plot suggesting that when individuals received an exam score of 151, they overlapped at the 58-80 reported self-efficacy score. It was clear from the plot that the higher individuals' sense of computer self-efficacy, the higher their Science scores regardless of gender.

Finding for Science Factorial ANOVA on Ethnicity and CSE: There were no significant relationships on ethnicity when comparing Science exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare individuals' Science exam scores with their ethnicity and computer self-efficacy scores. The main effect on ethnicity was determined to be non-significant: $F\,(4, 22) = .646$, $p = .635$. Likewise, the main effect on the computer self-efficacy score was also non-significant: $F\,(2, 22) = 2.535$, $p = .102$. Lastly, the interaction was also not significant: $F\,(2, 22) = 1.049$, $p = .367$.

Interpretation of Finding for Science Factorial ANOVA on Ethnicity and CSE. The results from the factorial ANOVA indicated that individuals' ethnicity nor their reported computer self-efficacy score had any significant effect on their Science exam scores. All of the p values both main effects and the interactions were above the required $> .05$ suggesting that there was no statistical significance between individuals' ethnicity and computer self-efficacy score when compared to their exam scores for the Science section.

Finding for Science Factorial ANOVA on SES and CSE: There were significant relationships on socio-economic status when comparing Science exam scores and computer self-efficacy scores. The factorial ANOVA results on the main effect of individuals' socio-economic was not statistically significance: $F\,(3, 24) = .017$, $p = .997$. There was, however, a statistically significant main effect on the computer self-efficacy score: $F\,(2, 24) = 5.406$, $p = .012$. There was also a statistical significance for the interaction: F (1, 24) = 7.131, p = .013. For the significant effect on the computer self-efficacy variable, the effect size of η^2 = .257 remained consistent with a medium effect size. The partial eta-squared value of .311 was suggestive of approximately 31% of the variance in students' computer self-efficacy score and the Science test scores could be contributed to their socio-economic status. The effect size of η^2 = .169 for the interaction was consistent with an almost medium effect size and the partial eta-squared indicated that approximately 23% of the variance in scores could be contributed to a student's computer self-efficacy and socio-economic status combined. In each of the household income categories reported (see Table 14), the highest Science test scores were displayed among those individuals who also reported the highest level of computer self-efficacy scores (36-57).

There were insufficient cases represented in the sample to use for comparison on an interaction plot for the household income ranges \$50,000-74,999 and > \$75,000. However, there was an interactive effect between computer self-efficacy scores and the socio-economic status of the examinees who reported a household income of < \$24,999 and \$25,000-49,999. A Tukey's post hoc test was performed but the results suggested no significant interaction between the socio-economic status groups.

Interpretation of Finding for Science Factorial ANOVA on SES and CSE. The findings from the factorial ANOVA analysis revealed a statistical significance for the main effect on the computer self-efficacy score: F (2, 24) = 5.406, p = .012 and for the interaction between computer self-efficacy score and socio-economic status: F (1, 24) = 7.131, p = .013. It should be noted that there were only two cases from the \$50,000-74,999 and > \$75,000 groups which does not provide an ample sample from which to make any conclusions or to allow for any generalizability. Due to so few samples in these income ranges it would not be recommended that this interpretation be considered dependable.   There were, however six representative of the $25,000-49,999 group and 23 representative of the < $24,999 group. It was shown from the factorial ANOVA output that individuals with higher Science exam scores had a higher sense of reported computer self-efficacy regardless of their socio-economic status.

Table 14

Descriptive Statistics for Socio-Economic Status and Computer Self-Efficacy Score for Science

Socio-Economic Status Categories	*Computer Self-Efficacy Score*	*N*	*M*	*SD*
< $24,999	36-57	11	152.82	5.456
	58-80	7	152.29	4.786
	81-129	5	148.20	3.701
	Grand Mean		151.65	5.078
$25,000-49,999	36-57	5	161.20	7.791
	58-80	1	143.00	
	Grand Mean		158.17	10.187
$50,000-74,999	36-57	1	156.00	
	Grand Mean		156.00	
< $75,000	36-57	1	157.00	
	Grand Mean		157.00	

According to the analysis conducted, there was a relationship that appeared to have existed when comparing gender and socio-economic status to Science exam scores and computer self-efficacy, however no relationship existed when comparing age and ethnicity to the same data set. Analysis suggested that, like that of Reasoning Through Language Arts, males had an overall higher mean average (M = 154.25) than did females (M = 152.58) with both having a higher sense of computer self-efficacy overall. Data analysis revealed that as the self-reported level of computer self-efficacy increased so did the Science exam scores. According to the Tukey output however, there was not a significant difference between the overall mean scores, and it could be suggested that the computer self-efficacy scores had the impact on the tests scores rather than the gender.

When using socio-economic status as the independent variable and comparing the Science exam scores and the computer self-efficacy level, it was discovered that there was a relationship that existed between the examinees' household income and their Science test scores. Unlike that of the Reasoning Through Language Arts scores, those that tested higher on the Science exam reported a household income of $25,000-49,999 and had a higher level of computer self-efficacy. Therefore, it was suggestive that the middle income level felt better about their sense of computer skills and scored better on the Science exam.

Mathematical Reasoning Factorial ANOVA Results

A factorial ANOVA was conducted on the dependent variable Mathematical Reasoning scores and the independent variables computer self-efficacy scores and the age, gender, ethnicity, and socio-economic status respectively. Each of the factorial ANOVA tests analyzed on the dependent variable, Mathematical Reasoning scores, had no statistically significant result at the $p = < .05$ level (see Appendix K).

Finding for Mathematical Reasoning Factorial ANOVA on Age and CSE: There were no significant relationships on age when comparing Mathematical Reasoning exam scores and computer self-efficacy scores.

Finding for Mathematical Reasoning Factorial ANOVA on Gender and CSE: There were no significant relationships on gender when comparing Mathematical Reasoning exam scores and computer self-efficacy scores.

Finding for Mathematical Reasoning Factorial ANOVA on Ethnicity and CSE: There were no significant relationships on ethnicity when comparing Mathematical Reasoning exam scores and computer self-efficacy scores.

Finding for Mathematical Reasoning Factorial ANOVA on SES and CSE: There were no significant relationships on socio-economic status when comparing Mathematical Reasoning exam scores and computer self-efficacy scores.

Finding for Mathematical Reasoning Factorial ANOVA on Age and CSE: There were no significant relationships on gender when comparing Mathematical Reasoning exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare individuals' Mathematical Reasoning exam scores with their age and computer self-efficacy score. The main effect on age was determined to be non-significant: $F(2, 20) = .524$, $p = .600$. Likewise, the main effect on the computer self-efficacy score was also non-significant: $F(2, 20) = 1.749$, $p = .600$. Lastly, the interaction was also not significant: $F(4, 20) = .620$, $p = .654$.

Interpretation of Finding for Mathematical Reasoning Factorial ANOVA on Age and CSE. The results from the factorial ANOVA suggested that neither an individuals' age nor their reported computer self-efficacy scores had any significant effect on their Mathematical Reasoning exam scores. The *p* values for the main effects and the interaction were $> .05$ suggesting that no statistical significance relationship existed between the dependent variable Mathematical Reasoning exam scores and the independent variables computer self-efficacy scores and age.

Finding for Mathematical Reasoning Factorial ANOVA on Gender and CSE: There were no significant relationships on gender when comparing Mathematical Reasoning exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare individuals' Mathematical Reasoning exam scores with the examinees gender and computer self-efficacy scores. The main effect on gender was non-significant: F (1, 23) = 517, p = .479 and the main effect on the computer self-efficacy score was also non-significant: F (2, 23) = .1.155, p = .333. Lastly, the interaction was also not significant: F (2, 23) = 1.270, p = .300.

Interpretation of Finding for Mathematical Reasoning Factorial ANOVA on Gender and CSE. Results from the factorial ANOVA suggested that individuals' gender nor their level of computer self-efficacy had an effect on their Mathematical Reasoning exam scores. All p values for the two main effects and the interaction were > .05 which indicated no evidence to suggest a significant relationship existed between the two independent variables and the dependent Mathematical Reasoning exam scores.

Finding for Mathematical Reasoning Factorial ANOVA on Ethnicity and CSE: There were no significant relationships on ethnicity when comparing Mathematical Reasoning exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare individuals' Mathematical Reasoning exam scores with the examinees' ethnicity and computer self-efficacy score. The main effect on ethnicity was non-significant: F (3, 22) = 1.603, p = .217 and the main effect on the computer self-efficacy score was also non-significant: F (2, 22) = 1.368, p = .275. Lastly, the interaction was also not significant: F (1, 22) = 1.668, p = .210.

Interpretation Finding for Mathematical Reasoning Factorial ANOVA on Ethnicity and CSE. The results from the factorial ANOVA output showed that there was no statistically significant relationship between the examinees' ethnicity nor computer self-efficacy scores with no significant effect on Mathematical Reasoning exam scores as all p values were > .05.

Finding for Mathematical Reasoning Factorial ANOVA on SES and CSE: There were no significant relationships on socio-economic status when comparing Mathematical Reasoning exam scores and computer self-efficacy scores. A factorial ANOVA was conducted to compare Mathematical Reasoning exam scores with the examinees' socio-economic status and computer self-efficacy score. The main effect on socio-economic status was non-significant: F (2, 29) = .448, p = .643 and the main effect on the computer self-efficacy score was also non-significant: F (2, 29) = .1.292, p = .643. Lastly, the interaction was also not significant: F (2, 29) = .784, p = .466.

Interpretation of Finding for Mathematical Reasoning Factorial ANOVA on SES and CSE. From the factorial ANOVA data analysis, the results showed that the individuals' socio-economic status nor their computer self-efficacy score had any significant effect on Mathematical Reasoning exam scores. Because the p values for both main effects and the interaction were > .05 there was no evidence that suggested any relationships existed between the dependent, exam score, and independent variables, computer self-efficacy score and socio-economic status.

To summarize, the results from the statistical findings suggested that when comparing the demographics on computer self-efficacy and Mathematical Reasoning exam scores no relationships appeared to have existed. This suggested that none of the demographics had an effect on the examinees tests scores or their sense of computer self-efficacy.

Perceived Challenges of Test Participants

First time GED interviewees were asked to participate in an interview upon completion of the initial section taken. Fifteen participants agreed to participate in the process in order to provide a better understanding of the emotions and feelings of first time examinees. The representative sample closely mirrored that of the population surveyed. Table 15 displays the representation of those interviewed.

The interview data were analyzed and coded based on the following questions:

1. How does the idea of taking the GED exam on computer make you feel?

2. How do you feel when you know you have to work with a computer? Do you experience anxiety or uneasiness?

3. How do you feel about your computer skills and ability to be able to take an exam on the computer?

4. In what way(s) did you need help in becoming familiar with the computer before taking the exam?

Table 15

Demographic Representation of Interviewees Compared to Those Surveyed

	Interview Sample (n)	Survey Sample (%)
Total count	15	100
Average age	21.53	21.67
Gender		
Male	8	43
Female	7	57
Ethnicity		
African-American	3	19
American Indian/Alaskan	0	2
Asian	0	3
Hispanic	1	4
Pacific	0	0
White	11	70
Multiple	0	2
Highest Education Level		
8th grade	0	7
9th grade	1	16
10th grade	5	22
11th grade	8	37
12th grade	1	18
Current Computer Skill		
Low (Beginner)	0	3
Intermediate (Average)	12	79
High (Advanced)	3	18
Annual Household Income		
Less than $24,999	12	68
$25,000-$49,999	2	25
$50,000-$74,999	0	2
$75,000 or more	1	5

Research Question 3: What challenges do GED examinees experience taking a GED computer-based exam?

Interview Finding 3.1: Interviewees felt comfortable taking the GED exam on computer.

Interview Finding 3.2: Interviewees did not experience anxiety or uneasiness while using a computer.

Interview Finding 3.3: Interviewees felt confident in their skills and ability to take an exam on the computer.

Interview Finding 3.4: Interviewees did not feel the need to become familiar with the computer prior to taking the exam.

Interview Finding 3.1: Interviewees felt comfortable taking the GED exam on computer. Interviewees were asked "How does the idea of taking the GED exam on computer make you feel?" Of those fifteen individuals that were interviewed, ten indicated that they felt "fine," "alright," or they "preferred computer tests over paper-based." Only two stated they had issues or concerns with the computer-based delivery of the exam by indicating that "It was really hard, because, like throughout high school you are so accustomed to taking it (tests) on paper." Another examinee mentioned that he or she had issues with his or her eyes and reading information from a computer or watching television for any length of time caused his or her eyes to become blurry. The remaining three gave more neutral responses such as "it doesn't really matter to me" and "it's not bad."

Interpretation of Interview Finding 3.1: Overall the majority of the responses from individuals were positive, and they felt comfortable taking the exam on computer rather than the traditional paper-based version.

Interview Finding 3.2: Interviewees did not experience anxiety or uneasiness while using a computer. The question "How do you feel when you know you have to work with a computer? Do you experience anxiety or uneasiness?" was asked of examinees interviewed. Thirteen individuals suggested that they did not experience anxiety when using a computer by stating "No, I am comfortable with it" and "No I am more comfortable with a computer test," which indicated overall that they either felt comfortable with computers or they were fine working with them. Of the two that stated they felt uneasy or were uncomfortable, one individual said "I get nervous. I am scared I am going to pick the wrong thing," and the other replied "Not really, you know you ain't got as much help so that kinda worries you. A little bothered I guess."

Interpretation of Interview Finding 3.2: The majority of respondents stated that they felt comfortable with computers, and they did not experience any uneasiness or anxiety when taking the exam on computer.

Interview Finding 3.3: Interviewees felt confident in their skills and ability to take an exam on the computer. An overwhelming 100% of examinees interviewed responded that they felt confident in their skills and ability to take an exam on a computer. Responses to the question "How do you feel about your computer skills and ability to be able to take an exam on the computer?" returned comments such as "I feel good", "Fine", "Confident" and "Really well. I started messing around with computers when I was seven so I'm pretty familiar with them." In an attempt to better understand if the examinees interviewed had any experience taking a computer-based exam prior to taking their GED exam in an authorized testing center, each individual was asked the following question: "Did you take the pretest." The pretest referred to the one provided for $6 per attempt through the official GED website. Of the 15 interviewed, eight or 51% indicated that they had taken the pretest. This information was beneficial and provided a solid foundation for representation of interviewees who had experience with delivery of some form of online or computer-based test. One individual alluded to the fact that his taking the pretest on computer may been why he was more comfortable taking the GED on computer instead of paper by stating "Yes mam, that might have been why I was fine with the test."

Interpretation of Interview Finding 3.3: These findings revealed that individuals had access to computers in their daily lives and may have taken the GED pretest on computer, therefore they felt prepared to use the computer on such things as computer-based exams. Slightly more than half of those interviewed stated they had taken the official GED Ready practice test and that they found it a useful tool in preparing for the exam.

Interview Finding 3.4: Interviewees did not feel the need to become familiar with the computer prior to taking the exam. Individuals were asked "In what way(s) did you need help in becoming familiar with the computer before taking the exam?" Of the fifteen examinees interviewed, 14 said that they did not need any preparation prior to taking the GED exam on computer. Their responses included statements such as, "None, just learned it from school," and "I didn't need no help. It's common sense." The one who did have concerns indicated that he or she needed help with "Mainly just typing."

Interpretation of Interview Finding 3.4: All but one individual who was interviewed stated they not feel the need to become familiar with a computer prior to taking the exam. The one who had concerns specified that he or she lacked the typing skills necessary to make testing easier.

Those who participated in the interview process for this study mirrored the demographic population sampled for the survey (see Table 15). The results of the interviews suggested that individuals felt comfortable with their computer skills, and essentially, their scores on the section of the exam taken reflected that confidence. Individuals reported that they felt comfortable and confident in their ability to use a computer and did not report having experienced any uneasiness or anxiety when testing on the computer.

Summary of Findings

The decision to offer the General Equivalency Diploma (GED) solely on computer was implemented in January 2014. This decision created concerns surrounding computer-based testing for individuals with computer familiarity problems as limited research had been conducted to analyze any effects it may have had on the examinee. This study generated statistically significant findings that could assist in the discussion of the needs that GED examinees may have with computer-based testing. This research focused on determining individuals' level of computer self-efficacy, rather than questioning their familiarity with a computer. This was done by creating a score using their self-reported levels of usability for hardware subscale, software subscale, and internet subscale in an attempt to fill the research gap on computer self-efficacy of GED examinees.

For Question 1, the results revealed that there were statistically significant relationships that existed between the Reasoning Through Language Arts exam scores as well as Science exam scores when using the participants' computer self-efficacy scores. Both ANOVA results from these correlations suggested that as the individuals' computer self-efficacy levels increased, or their ability to use a computer effectively rose, so did their test scores. These results were consistent with the limited research conducted on computer-based testing when factoring an individual's level of computer-self efficacy. One would expect to see that as individuals' computer comfort level increase and they become more confident with their ability to use a computer to take a computer-based test, their scores would reflect that comfort same level.

For Question 2, there were two statistically significant findings when using a factorial ANOVA: 1) there were statistically significant relationships on age, gender, and socio-economic status when comparing the Reasoning Through Language Arts exams scores and computer self-efficacy scores and 2) there were statistically significant relationships on gender and socio-economic status when comparing Science exams scores and computer self-efficacy scores. When factoring age as the independent variable, it appeared that younger examinees between the ages of 16-18 had higher scores for the Reasoning Through Language Arts section of the exam than those ages 25-44. For gender on the same section of the exam, data analysis revealed that both males and females overall had higher exam scores for the Reasoning Through Language Arts section although the difference was not significant for either group with a reported computer self-efficacy score of 58-80. This main significance appeared when a lower computer self-efficacy score (36-57), or high sense of self-efficacy existed. With reportedly too few samples for those identifying a household income of $50,000 – $75,000, it would not be suggested that the interpretation of the data be considered generalizable, however for those with less than $24,999 findings suggested higher RLA exam scores when the individual reported a computer self-efficacy score of 58-80.

Similar to the analysis using Reasoning Through Language Arts, there were statistically significant relationships on gender and socio-economic status when comparing the Science exams scores and computer self-efficacy scores. Similar to the findings for Reasoning Through Language Arts, scores were higher for both males and females on the Science exam when their higher level of computer-self efficacy was a factor. Although the findings using the independent variable, socio-economic status produced statistically significant results, there were too few cases in the $50,000-74,999 and > $75,000 to recommend the data be considered dependable or generalizable to the overall population. Of those in the household income of $24,999 and $25,000-49,000 results could suggest individuals with higher Science scores had a higher sense of computer self-efficacy.

Question 3 was added to the research study as a means to capture qualitative data and enhance the outcomes of the statistical analysis from the survey results. Individuals were asked a list of questions by the researcher to determine if they had concerns taking the GED on computer. The sample was representative of the overall sampled surveyed for the research study. Respondents indicated they felt comfortable taking the exam on the computer, did not experience anxiety or uneasiness, felt confident in their abilities to use a computer, and did not feel they needed to become familiar with the computer prior to taking the exam. However, the few that did express concerns were troubled by the transition from the traditional paper-based to a computer based-test from which they were accustomed. One individual alluded to issues with vision and indicated that she or she had difficultly viewing material on a computer monitor. Those that took the pre-test on computer stated they were more confident with their ability to take the exam on the computer and displayed a more positive attitude towards computer-based testing.

Chapter V

CONCLUSIONS, DISCUSSIONS, AND RECOMMENDATIONS

Introduction

The purpose of this study was to investigate whether relationships existed between the degree of computer self-efficacy of examinees and their performance on the computer-based 2014 GED exam and to make recommendations that would address this challenge. There were 100 participants that completed the Computer Self-Efficacy Scale for Adults (CSESA) Survey and 15 who completed the interview process. This study used a convergent parallel mixed methods approach by using both quantitative and qualitative research and was guided by the following research questions:

1. What relationships, if any, exist between the computer self-efficacy of examinees and participants' performance on their initial section of the computer-based GED exam taken?

2. To what degree, if any, do the following demographic factors affect the interactions between computer self-efficacy and a computer-based GED exam?

    a) age

    b) gender

    c) ethnicity

    d) socio-economic status

3. What challenges do GED examinees experience when taking a GED computer-based exam?

Overview of the Study

Since the inception of the new computer-based GED exam, which was adopted and implemented in 2014, minimal data existed surrounding issues examinees may have had regarding their ability to be effective on computer-based exams due to their level of computer self-efficacy. Clymer (2012) recognized the concerns with the transition from a paper-based to computer-based GED exam. “Many recognize the need for computerizing the GED test as well as the importance of computer literacy in the marketplace. Nonetheless this change may present challenges in effectively serving test takers that lack access to and proficiency with computers” (Clymer, 2012, p. 5). *The Computer-Based Testing Usability Study* (2011b) was conducted in 2010 by the GED Testing Service® and published in 2011, however minimal research has been produced since that time regarding GED examinees’ ability to effectively take an exam on the computer.

Description of Sample

The sample for this research consisted of 100 first-time computer-based GED examinees who voluntarily completed a CSESA survey. In addition, there were 15 examinees who agreed to be interviewed by the researcher once they had completed the survey. The demographics section of the survey included questions regarding gender, age, ethnic group, highest level of education, self-identified computer skills rating, and annual household income. Of those surveyed, 43% were males and 57% were females, with an overall average age of 21.67 years. The majority of participants were identified as

White (70%), African American was represented with 19% and the other 11% were of American Indian/Alaskan, Asian, Hispanic and multiple ethnicities. Of those participants surveyed, they rated their current level of computer skills as Low (Beginner) 3%, Intermediate (Average) 79%, and High (Advanced) 18%. The following highest levels of high school education were self-reported: eighth grade (7), ninth grade (16), tenth grade (22), eleventh grade (37), and twelfth grade (18). The majority of those surveyed indicated an annual household income of less than $24,999.

Procedures

With the use of James H. Brown's Computer Self-Efficacy Scale for Adults (CSESA) survey (2008), the researcher gathered descriptive statistics for 36 questions regarding the participants' perceptions of their own self-efficacy in their use of a computer. Computer self-efficacy scores ranged between 36, representing the highest level of computer self-efficacy, to 216 resulting in the lowest level reported. All test score outliers were addressed and participants' computer self-efficacy scores were sorted and coded into three groups based on the standard deviation of the overall computer self-efficacy scores. For Research Questions 1 and 2, data were collected from 100 participants' completion of the Computer Self Efficacy Survey for Adults, to include demographic data, all obtained from Ogeechee Technical College or Coastal Pines Technical College. Surveys were administered after an individual's first attempt at the computer-based GED exam. Test score information was gathered from the GED Navigator database managed through a joint partnership between the GED Testing Service® and the Technical College System of Georgia. Test scores ranged from 105 as a minimum to 173 as a maximum depending on the section taken. An analysis of variance

(ANOVA) was conducted to answer research question one to examine whether relationships existed between individuals' computer self-efficacy and their performance on the initial section of the GED exam taken. A factorial analysis of variance (ANOVA) test was conducted to answer research question two as a means to determine if demographic factors affected the interactions between computer self-efficacy and computer-based GED exam. Research question three addressed qualitative interviews to gain a greater understanding and insight into any relationships that existed between GED test taker's computer self-efficacy and their demographic characteristics and test results. The researcher used a set of interview questions to gather information from 15 participants. Each participant had completed the GED exam on computer as a first-time examinee and voluntarily agreed to be interviewed by the researcher.

Conclusions

The findings from the research study generated the following conclusions:

1. Computer self-efficacy does seem to have a relationship on performance. Individuals who took the Reasoning Through Language Arts section and Science section of the GED exam had a higher sense of computer self-efficacy and in turn had overall higher exam scores.

2. Younger examinees appeared to have had better results on the GED exam than those who were older. It was determined that overall, the younger population (age 16-19) sampled scored higher ($M = 157.95$) on the Reasoning Through Language Arts section of the GED exam. Upon closer examination the data showed that examinees in the 16-18 age category scored higher when they indicated a high sense of computer self-efficacy. However those between the

ages of 19-44 scored higher on the same section when they reported a moderate computer self-efficacy.

3. Gender did not appear to have an effect on the GED exam scores. The research showed that males scored higher (M = 155.95) on the Reasoning Through Language Arts section of the GED exam than did females (M = 154.02) however, there was not a considerable difference. It was also determined that both males and females who scored the highest on the Reasoning Through Language Arts section reported a moderate computer self-efficacy score. The overall mean score for the Science section of the GED exam was higher for males (M = 154.25) than for females (M = 152.58) which was comparable to that of the Reasoning Through Language Arts scores. For both genders those that scored the highest on the exam also reported the highest level of computer-self efficacy.

4. Those examinees with the highest annual household income did better on the GED exam, whereas those who were poorer were not as successful. When comparing the socio-economic status of the examinees, the research showed that those individuals who reported the highest levels of income had the highest scores on the Reasoning Through Language Arts section of the GED exam. In comparison those reporting the lowest level of income reported scored the lowest on the same section of the exam. Socio-economic status played a role in the relationship between the examinees' scores and their level of computer self-efficacy. For the Science section of the GED, those who reported the highest level of household income had the highest exam scores, as well as, the highest level of computer self-efficacy. As to be expected, like that reported for the

Reasoning Through Language Arts scores, those with the lowest level of reported household income scored the lowest on the Science section of the GED.

5. Those who took the Reasoning Through Language Arts and Science sections of the GED exam had higher scores. Overall findings suggested individuals may have better results depending on which section was taken.

Discussion

The topic for the research study was generated from a concern for GED examinees and the possibility of the lack of computer skills necessary to take the new computer-based GED exam. During the time of the design of this research study there were limited data or research that would sufficiently address concerns that the adult education staff had regarding the ability for adult education students to be successful on a computer-based exam. It was difficult at that time to determine if that concern originated from the level of computer self-efficacy or the actual content of the exam. Both the mode of delivery, as well as the content of the exam changed simultaneously and only one research study had been conducted dating back to 2006 that addressed concerns individuals had with taking the GED exclusively on computer. Although this research study did not focus on content, it did address the level of computer self-efficacy an individual had and it can be interpreted from both the quantitative and qualitative data analysis that there were insufficient statistical findings that suggested individuals were any less successful on the section of the GED exam taken due to their ability to use a computer. According to research published by Director of Public Affairs of the GED Testing Service in 2013, Turner submitted that key data from an internal analysis suggested examinees were more successful on the computer-based exam. Statements indicated that examinees who took the exam on the computer experienced less stress, were ready for technology, and most importantly were comfortable with testing using a computer. Those results were consistent with research that indicated that more examinees were earning their GED through the computer-based testing process rather than the traditional paper version (Turner, 2013). Similar to the research outcomes from this study, it can be deduced from both research studies that the data suggested examinees were comfortable with the computer-based process.

After the conclusion of this study, GED Testing Service announced in the early part of 2016 that the GED passing score was lowered from a 150 to a 145 for each section of the exam. Beverly Smith, Assistance Commissioner for the Technical College System of Georgia stated that the decision was “based on data collected over the past 18 months which give the GED program the capability to now assess an adult learners’ knowledge across the entire spectrum of a typical graduating high school class” (B. Smith, 2016). Although this change would not have affected the overall findings of the study, it could have affected the degree of the relationships that existed between variables considering the pass rate was lowered rather than raised.

An interesting result of this study was that the analysis of the variances generated negative correlations or relationships between exam scores and computer self-efficacy. These findings were due to the design of the research study, in particular the Computer Self-Efficacy Survey for Adults. In order for individuals’ to have a high level of computer self-efficacy, they would have scored a 36-57 on the scale, while the lowest level would have reported an 81-129. When factoring in the exam scores of the participants, analysis of the data suggested negative *r* values which indicated individuals with lower computer efficacy scores generated higher exam scores. Hence, as one variable increases (exam scores), the other variable decreases (computer self-efficacy), likewise, as one variable decreases, the other variable increases resulting in a negative correlation. A solution to this issue would have been to reorganize the Likert-scale developed by Brown, however for fear of diminishing the validity and reliability of the instrument the researcher chose to use the survey as it was presented.

In addition, due the nature of a survey instrument that captures perceptual data and a Likert-scale that produced negatively correlated results it could be suggested that participants may have misread the instructions for completing the instrument assuming 1 meant a lower confidence rating and 6 indicating a highest confidence rating. This could help explain findings that were not supportive of the theory that as individuals' sense of computer self-efficacy increases so would their test scores. Likewise, it could also be suggested that individuals who participated in the study may have chosen to devalue their ability to use a computer by providing responses they would consider as safe or "right" answers in turn causing a deflation of their sense of computer self-efficacy.

Overall, when comparing the computer self-efficacy with Reasoning Through Language Arts and Science scores, the findings showed that as the individuals' sense of computer self-efficacy increased so did their test scores but this was not the case for Social Studies or Mathematical Reasoning sections of the GED exam. This conclusion was consistent with research which found that the degree of computer familiarity had not proven to be an issue among testing candidates (George-Ezzell & Hsu, 2006). It was also discovered, when using demographics in comparison to the level of computer self-efficacy and the section of the GED exam taken that there were significant relationships that existed for both gender and socio-economic status when using Reasoning Through Language Arts and Science scores and the sense of computer self-efficacy of the individuals surveyed.

Although not considerably higher, males did score higher on both the Reasoning Through Language Arts and Science sections of the GED exam than did females. Both scored the highest when computer self-efficacy was at the reported highest level, equally those with lower computer self-efficacy scores had lower exam scores. There were significant relationships on socio-economic status for both Reasoning Through Language Arts and Science exam scores and there were differences for the computer self-efficacy levels, however, both reported higher exam scores at the highest income levels and lower scores at the lower reported socio-economic levels.

Likewise a relationship existed when using the demographic age as the independent variable but only when using Reasoning Through Language Arts as a dependent variable which suggested that the younger examines, aged 16-18 had high exam scores for that section taken than did any other age group. The results suggested that the younger age group may be recent high school drop outs who were more familiar with computers, the material, as well as the standardized testing process, therefore providing an explanation for the higher scores.

It was determined from the analysis of the data that those individuals who reported a higher household income also achieved higher test scores for the Reasoning Through Language Arts section of the GED exam. However, for both sections there were insufficient representation in the > $50,000 to consider the findings generalizable to that population segment. A significant relationship existed for those who tested in both sections with the overall highest scores representing those who reported a household income in the $25,000-49,999 range, or middle income level. Likewise, those who reported being in the lowest income range ($24,999) had the overall lowest grand mean scores.

In addition to the survey process, 15 individuals voluntarily agreed to be interviewed in order to gain insight into any challenges examinees experienced while taking the GED on computer. Among those interviewed, the majority reported confidence in their ability to use a computer and indicated they would have preferred to take the exam on the computer rather a traditional paper-based process. These findings were consistent with George-Ezzelle and Hsu's GED candidate computer familiarity survey. In that study, when asked which type of test administration individuals would choose, paper and pencil or computer-based, "67.5% indicated their preference was for a computer-based format" (George-Ezzelle & Hsu, 2006, p. 8). Interviewees also reportedly stated that they did not experience any uneasiness or anxiety while taking the exam and did not feel the need to have been familiarized with computers prior to testing. Furthermore, when asked, the majority of those interviewed stated they took the GED Ready pretest on computer prior to completing their GED. The pre-test was an optional service provided by the GED Testing Service and the individual's scores were a predictor to success on the GED exam. The GED Testing Service stated (2016) on its GED Ready Practice Test website that "Students who prepared using the official practice test from GED Testing Service pass at a higher rate" however no official research has been published to support this suggestion. In conclusion, the majority of those interviewed felt comfortable using computers, reported little or no anxiety, and the exam scores were positively related to their level of computer self-efficacy.

Limitations

A convenience sampling process was used to capture participant data and limited the extent to which individuals outside of the geographical area could be included. In addition, this research relied on perceptual data gathered from the respondents. This type of research is subjective and perceptual data limit the degree of confidence to which the conclusions could be inferred resulting in limitations to the generalizability of the study's outcomes. In addition, there was a small representative sample of 100 individuals who were surveyed and 15 who were interviewed over the course of 9 months which could also lead to generalizability concerns.

Recommendations

The findings and conclusions of the statistical results from this study led the researcher to make the following recommendations to improve the experiences for first-time computer-based GED examinees in both the area of research and practice:

Recommendations for Research

1. More research needs to be conducted on issues surrounding computer-based testing for GED examinees, specifically for those over the age of 45. This study captured data for those under the age of 48 only due to a convenience selection process. The research led the researcher to consider the reason individuals over the age of 48 did not take the exam was due to content rather than a fear of the computer or the lack of computer skills.

2. Data was captured from a majority of individuals who self-identified their ethnicity as White. It is recommended that a research study be conducted that would encourage others of different ethnicity to participate in order to obtain more information from various groups.

3. The study was small in size with 100 survey participants and 15 interviewees. It is recommended a larger scope research study be conducted for more effective generalizability.

4. This study was specific to Georgia with the target area encompassing two technical college systems service delivery areas. It is recommended that other areas, including urban areas, be targeted in and outside Georgia for a more comprehensive research study.

5. Considering the pass rate was lowered, the research could be re-analyzed using the same statistical data to determine if the strength of the relationships that existed increased.

6. The research study showed that there was little concern regarding individuals' computer skills leading the researcher to consider the decrease in examinees may be due to exam content. More research should be conducted to determine if there is a concern surrounding the content of the new exam and address any issues through recommendations.

7. A more discriminatory instrument could be used to gage individuals' perception of their sense of computer self-efficacy. The Likert-scale tool that was used for this research study only measured individuals' confidence rating on

hardware, software, and intent usage; further research into the structural variables could lead to a more precise evaluation of their perceived abilities.

8. The computer self-efficacy score was grouped into three categories (36-57, 58-80, and 81-129) to ensure sufficient representation for each grouping. These categories were created from a survey instrument that gathered perceptional data only; a larger sample size would have allowed for groupings with narrower parameters which could have produced more precise findings regarding the overall sense of computer self-efficacy and increase in test scores. This could assist in eliminating the potential for the appearance of a deflation of one's ability to successfully use a computer to take a high-stakes exam and better support the theory that the higher the level of computer self-efficacy the higher the test results.

9. Although certain laws prohibit educators from requesting information regarding disability services, it could be suggested that a question be added to the survey that would allow individuals to disclose if they had, at any time in their life, received services for a learning disorder which provided them with assistance in taking tests in school. This question would have captured one aspect of a particular population that could further aid in explaining the possible need for assistance for some examinees.

10. The prison population is also required to take the GED exam on computer and although the process for delivery of the exam is slightly different (prisoners do not have access to the internet) they are still expected to take the exam on the computer. The very nature of this population creates issues that could be

problematic for computer-based testing. More research should be done to determine if prisoners are confident in their ability to successfully use a computer to take a high-stakes exam such as the GED.

Recommendations for Practice

1. It is recommended that targeted groups of individuals with lowers scores (i.e., the older population, various ethnicities, and reported income levels < $24,999) be considered when teaching the content and include more common practice of familiarizing individuals with computers prior to them taking the GED exam. It is also recommended that these groups be encouraged to take the pretest offered by the GED Testing service prior to attempting the actual exam.
2. Discover means to encourage particular groups who scored lower on the GED exams or were not represented well in the sample (i.e., the older population, various ethnicities, and reported income levels < $24,999) to enroll in adult education programs through targeted advertisement.
3. For those who have issues with content and/or computer skills, discover ways to create a seamless transition from the classroom to the testing center by encouraging more individuals who have concerns to take the online GED Ready practice exam offered by GED Testing Service prior to attempting the official exam.
4. It is recommended that GED students be prescreened to identify issues, other than accommodated needs, that may cause problems with computer-based testing. For example, services can be offered through the testing center that can alleviate some issues without the need for official accommodations. These include but are

not limited to private rooms, contrast screens for easier reading, and headphones to reduce distractions.

Overall, findings suggested significant relationships existed between examinees' computer self-efficacy and their scores on the Reasoning Through Language Arts and Science sections of the GED but not for the Social Studies or Mathematic Reasoning. For those two sections, as the individuals' sense of computer self-efficacy increased so did the exam scores. Furthermore, significant relationships existed for the same sections when factoring in the demographics gender and socio-economic status which suggested that males did slightly better than females and that as the household income levels increased so did the test scores. It was not surprising to find that at least one relationship was found to be significant when using age which suggested that the younger students did better on the Science section of the GED exam.

In conclusion, it was interesting to discover from the statistical findings, in conjunction with the interviewees' comments, that individuals did not experience anxiety or uneasiness and were overall comfortable with using the computer to take their GED exam. These results coincided with the limited research that did exist on computer-based testing. Findings from this study attempted to alleviate concerns which may have existed from others who suggested GED examinees had issues with taking the high-stakes exams on a computer rather than the traditional pencil-and-paper method. The overall conclusions of the findings led the researcher to consider content as the main concern for examinees rather than computer self-efficacy.

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APPENDIX A:

Computer Self-Efficacy Scale for Adults (CSESA) Survey
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APPENDIX A

COMPUTER SELF-EFFICACY SCALE FOR ADULTS (CSESA) SURVEY USED BY

Informed Consent:

Thank you for participating in this survey. Your feedback is important. Please answer the following questions as honestly as possible. The purpose of this survey is to help the researcher measure relationships that may exist between the degree of computer self-efficacy of examinees and their performance on the computer-based 2014 GED® exam. I do not anticipate that taking this survey will contain any risk or inconvenience to you. Furthermore, your participation is strictly voluntary and you may withdraw your participation at any time without penalty. All information collected will be used only for my research and will be kept confidential. There will be no connection to you specifically in the results or in future publication of the results. Once the study is completed, I would be happy to share the results with you if you desire. In the meantime, if you have any questions please ask or contact:

Questions regarding the purpose or procedures of the research should be directed Deedee Thomas at (912) 487-6127 or tanthomas@valdosta.edu. This study has been approved by the Valdosta State University Institutional Review Board (IRB) for the Protection of Human Research Participants. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 229-333-7837 or irb@valdosta.edu.

By completing this survey you are verifying that you have read the explanation of the study, and that you agree to participate. You also understand that your participation in this study is strictly voluntary.

Computer Self-Efficacy Survey

1. What is your gender:

☐ Male

☐ Female

2. What is your age? _____

3. Which ethnic group best describe you?

☐ African American

☐ American Indian/Alaskan

☐ Asian

☐ Hispanic

☐ Pacific

☐ White

☐ Multiple

7. Have you ever taken the GED on computer?

☐ Yes

☐ No

4. What best describes your highest level of education? ___________________________

5. How would you rate your current level of computer skills and knowledge about computers?

☐ Low (Beginner)

☐ Intermediate (Average)

☐ High (Advanced)

6. What category best describes your annual household income?

☐ Less than $24,999

☐ $25,000-$49,999

☐ $50,000-$74,999

☐ $75,000 or more

The statements that follow describe common tasks that you might perform when using a computer. Each statement begins with the words "I feel confident ..." Following each statement there are six possible choices, ranging from "Completely Agree" to "Completely Disagree." Read each item. Then, please click on the ONE circle that corresponds to the choice that best describes the degree to which you agree or disagree with the statement. You will see a check mark appear in the circle. To change your mind, just click on a different circle. Please be sure to answer each question.

	For each of the following statements, choose the response that best describes to what extent you agree or disagree with it.	I completely agree	I mostly agree	I somewhat agree	I somewhat disagree	I mostly disagree	I completely disagree
1	I feel confident in knowing how to set up a computer connection to the Internet.	☐	☐	☐	☐	☐	☐
2	I feel confident using a computer operating system (such as Windows or Apple.	☐	☐	☐	☐	☐	☐
3	I feel confident knowing how to download files from the Internet.	☐	☐	☐	☐	☐	☐
4	I feel confident knowing how to read an Internet address.	☐	☐	☐	☐	☐	☐
5	I feel confident copying information from the computer drive to an external flash drive.	☐	☐	☐	☐	☐	☐
6	I feel confident using software to learn how to do new things on a computer.	☐	☐	☐	☐	☐	☐
7	I feel confident in saving or deleting information using a floppy disk.	☐	☐	☐	☐	☐	☐
8	I feel confident knowing how to set up an electronic mail (e-mail) account on the Internet.	☐	☐	☐	☐	☐	☐
9	I feel confident using a computer keyboard.	☐	☐	☐	☐	☐	☐

		I completely agree	I mostly agree	I somewhat agree	I somewhat disagree	I mostly disagree	I completely disagree
10	I feel confident in knowing how to use a personal identification number (PIN) to access an Internet account on the computer.	☐	☐	☐	☐	☐	☐
11	I feel confident in knowing how to send attachments to others over the Internet.	☐	☐	☐	☐	☐	☐
12	I feel confident in knowing how to send attachments to others over the Internet.	☐	☐	☐	☐	☐	☐
13	I feel confident using the Universal Serial Bus (USB) port on a computer.	☐	☐	☐	☐	☐	☐
14	I feel confident setting up a computer network in my home.	☐	☐	☐	☐	☐	☐
15	I feel confident about inserting a compact disc (CD) into the proper computer drive.	☐	☐	☐	☐	☐	☐
16	I feel confident about using a printer to make copies of my work on the computer.	☐	☐	☐	☐	☐	☐
17	I feel confident about installing a software program correctly.	☐	☐	☐	☐	☐	☐
18	I feel confident using computer software (such as excel) to analyze data (numbers).	☐	☐	☐	☐	☐	☐

19	I feel confident setting up a new computer system right out of the box.	☐	☐	☐	☐	☐	☐
20	I feel confident in knowing how to manage cookies (small personal files) on the Internet.	☐	☐	☐	☐	☐	☐
21	I feel confident understanding typical computer words for hardware, such as plug-and-play (PnP) devices.	☐	☐	☐	☐	☐	☐
22	I feel confident knowing how to use a computer to search for information at the library.	☐	☐	☐	☐	☐	☐
23	I feel confident about shutting down a computer system.	☐	☐	☐	☐	☐	☐
24	I feel confident using computer software to add or delete information from a file I have created.	☐	☐	☐	☐	☐	☐
For each of the following statements, choose the response that best describes to what extent you agree or disagree with it.							
25	I feel confident using the menu options from within a software program.	☐	☐	☐	☐	☐	☐
26	I feel confident using the computer to go online.	☐	☐	☐	☐	☐	☐

27	I feel confident using an Internet browser (such as Internet Explorer) to access the World Wide Web (WWW).	☐	☐	☐	☐	☐	☐
28	I feel confident using antivirus software on a computer.	☐	☐	☐	☐	☐	☐
29	I feel confident playing games on a computer.	☐	☐	☐	☐	☐	☐
30	I feel confident responding to a dialog box within a software program.	☐	☐	☐	☐	☐	☐
31	I feel confident using a computer mouse to point or click on the computer screen.	☐	☐	☐	☐	☐	☐
32	I feel confident using a computer modem to connect a computer to the Internet.	☐	☐	☐	☐	☐	☐
33	I feel confident using a search engine (such as Google) to find information on the Internet.	☐	☐	☐	☐	☐	☐
34	I feel confident starting or quitting a computer software program.	☐	☐	☐	☐	☐	☐
35	I feel confident using a computer software program (such as Word) to write a report.	☐	☐	☐	☐	☐	☐
36	I feel confident using computer software to manage file storage on a computer hard drive.	☐	☐	☐	☐	☐	☐

APPENDIX B:

Author’s permission to use Computer Self-Efficacy Scale for Adults (CSESA)

APPENDIX B

AUTHOR'S PERMISSION TO USE COMPUTER SELF-EFFICACY SCALE FOR ADULTS (CSESA)

November 11, 2013

Hello, Deedee:

I received your email and I am happy to attach the CSESA survey instrument itself as well as the technical report which describes how it was designed and validated. It was designed for an older adult population taking beginning computer courses on computer skills and technology. It is best suited for people who have fairly low computer skills. It may be a little dated now, but you may be able to adapt or update it to fit your needs. Keep in mind if you plan to monitor instructional effects, it takes a pretty large number of people to find statistically significant changes in this type of survey.

Best wishes in your research, and feel free to let me know whether the CSESA was of use to you in your dissertation work. You may use the instrument in your work; all I ask is that if you publish it, please make the usual acknowledgment in your references and citations. The CSESA attachments are PDFs.

James

--
James H. Brown, Ph.D.
University of Wisconsin-Milwaukee
Urban Education, Administrative Leadership; Adult and Continuing Education Boomers and beyond: "Come on along and zoom with me!"
jhbrown@uwm.edu

APPENDIX C:

Administrative Guidelines for Using Computer Self-Efficacy Scale for Adults (CSESA) Obtained from Brown, J. (2008) *Developing and using a computer self-efficacy scale for adults.*

APPENDIX C

ADMISTRATIVE GUIDELINES FOR USING COMPUTER SELF-EFFICACY SCALE FOR ADULTS (CSESA)

Administration guidelines

The 36 items that compose the CSESA should require about 15 minutes to complete. There are four pages (parts) to the instrument; the first page collects demographics, while the last three collect the survey responses. The instrument should be produced in readable font, such as Arial 12 point.

Unless the CSESA is to be scored electronically, it is not necessary to shade the circles for the responses; instead, subjects may mark legibly with an “X” or check within the circle. Before respondents begin taking the questionnaire, read the instructions for the survey. Be sure to indicate that it is a survey that has no right or wrong answers and that it is asking how they feel about the particular computer skills that are described.

Briefly review the wording of the items (“*I feel confident*…”) followed by a specific six response options: I completely *agree*; I mostly *agree*; I somewhat *agree*; I somewhat *disagree*; I mostly *disagree*; I completely *disagree*. If this instrument is administered to an older adult population, it is important to point out that the responses shift from agreement to disagreement as one goes from left to right. To prevent confusion, the phrasing of the items and the positions of the responses do not change. It is important that all the items in the CSESA are answered. Remind the subjects to be sure to complete each item and to briefly check it to be sure they have completed every item before handing it in. Announce that respondents may begin the questionnaire, remain available, and have a designated place to collect responses (Brown, 2008).

APPENDIX D:

Interview Form

APPENDIX D

INTERVIEW FORM

Informed Consent:

Thank you for participating in this interview. Your feedback is important. Please answer the following questions as honestly as possible. The purpose of this interview is to help the researcher measure relationships that may exist between the degree of computer self-efficacy of examinees and their performance on the computer-based 2014 GED exam. I do not anticipate that your participation in this process will contain any risk or inconvenience to you. Furthermore, your participation is strictly voluntary and you may withdraw your participation at any time without penalty. All information collected will be used only for my research and will be kept confidential. There will be no connection to you specifically in the results or in future publication of the results. Once the study is completed, I would be happy to share the results with you if you desire. In the meantime, if you have any questions please ask or contact:

Questions regarding the purpose or procedures of the research should be directed Deedee Thomas at (912) 487-6157 or tanthomas@valdosta.edu. This study has been approved by the Valdosta State University Institutional Review Board (IRB) for the Protection of Human Research Participants. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 229-333-7837 or irb@valdosta.edu.

By participating in this process you are verifying that you understand the explanation of the study, and that you agree to participate. You also understand that your participation in this study is strictly voluntary.

Time of Interview:

Date:

Place:

Interviewer:

Interviewee:

Questions:

1. How does the idea of taking the GED exam on computer make you feel?

2. How do you feel when you know you have to work with a computer? Do you experience anxiety or uneasiness?

3. How do you feel about your computer skills and ability to be able to take an exam on the computer?

4. In what way(s) did you need help in becoming familiar with the computer before taking the exam?

(Thank you for participating in this interview. Your responses will remain confidential.)

APPENDIX E:

GED Test Candidate Rules Agreement

APPENDIX E

GEDTEST CANDIDATE RULES AGREEMENT

GED® Test Candidate Rules Agreement

Please review and sign the following test rules, and ask the administrator if you have questions.

- ❒ I will not take the following types of personal items into the testing room: cellular phones, hand-held computers/personal digital assistants (PDAs) or other electronic devices, pagers, watches, wallets, purses, hats (and other head coverings), bags, coats, books, or notes. Studying is not allowed in the test center.
- ❒ I will store these items in a secure area indicated by the test administrator. Cellular phones, pagers, and other electronic devices must be turned off prior to placing them in the designated secure area. The testing center is not responsible for lost, stolen, or misplaced personal items.
- ❒ I may bring my own handheld TI-30XS Multiview Scientific Calculator for the Mathematical Reasoning, Science, and Social Studies content area tests. I will store my handheld calculator in the secure storage area for Part 1 of the Mathematical Reasoning content area as instructed by the testing center staff and follow the testing center staff instructions regarding when to get it for use on Part 2 of the Mathematical Reasoning section.
- ❒ The test administrator will log me in to my assigned workstation, verify that I am taking the correct test and start the test. I will sit in my assigned seat until escorted out. I understand that eating, drinking, smoking, chewing gum, talking, or making noise that creates a disturbance for other candidates are prohibited during the test.
- ❒ If I am given test-specific material, I will not use the material until after the test has started. I will not remove these items from the testing room at any time during the test, and I will return them to the test administrator at the appropriate time.
- ❒ I understand and agree to abide by the terms of the Non-Disclosure Agreement that I agreed to when scheduling this test session.
- ❒ The test administrator will monitor me continuously while I take the test. The session may be videotaped or otherwise recorded.
- ❒ If I experience problems that affect my ability to take the test, I will notify the test administrator **immediately** by raising my hand, and I will not talk in the testing room. If I have other questions or concerns, I will raise my hand and the test administrator will assist me as long as other candidates are not disturbed. The test administrator cannot answer questions related to test content. If I have questions of this nature, I will contact GED Testing Service after I leave the testing center.
- ❒ I understand that there is a 10 minute scheduled break after each test when I am scheduled to take more than one test during a test appointment. I understand that GED Testing Service does not allow **unscheduled breaks**, for any reason. If I take an unscheduled break, I understand and agree that I will not be allowed back into the testing room, my test score will be invalidated, and I will forfeit my test fee.
- ❒ I will not remove copies of test questions and answers from the testing center, and I will not share or discuss the questions or answers seen on my test with others.
- ❒ After the test ends, the test administrator will come to my workstation and ensure my test has ended properly.

Your Privacy: Your test results will be transmitted to Pearson VUE and to GED Testing Service. The Pearson VUE Privacy Policy Statement provides additional information regarding this; you can obtain this by visiting the Pearson VUE website (www.pearsonvue.com) or by contacting a Pearson VUE Call Center.

Candidate Statement: *By signing below or providing a digital signature, I give Pearson VUE and GED Testing Service my explicit consent to retain and transmit my personal data and test responses to Pearson VUE, to GED Testing Service and to the state or jurisdictions in which I am applying for a high school equivalency credential. I understand the information provided above and agree to follow the Rules. If I do not follow the Rules, or I am suspected of cheating or tampering with the computer, this will be reported to Pearson VUE and GED Testing Service, my test fee may be forfeited, my test scores may be invalidated and GED Testing Service may take other action as it deems appropriate.*

Name (Please print): ____ Date: _________________

Signature____ Test: ________________

GED® TEST NON-DISCLOSURE AGREEMENT

I certify I am the person whose name and address appears on the GED® test registration. I also certify that I will be taking the GED® test to qualify for a high school credential within a jurisdiction and for no other purpose. I understand and agree GED Testing Service LLC owns the GED® test, the questions, and answers. I understand the GED® test is a confidential and secure test, protected by the laws of the United States and elsewhere, including but not limited to copyright laws. I agree that I will not discuss or disclose the content of the GED® test, questions or answers with anyone and I will not record, copy, or disclose any GED® test question or answer, in whole or in part in any form or by any means (orally, in writing, in any internet message board, chat room, forum or otherwise.)

I have read, understand and agree to the terms and conditions described in the GED® Candidate Test Bulletin including without limitation those related to:

- GED® fees, retake and other testing policies, and score cancellations for irregularities and inappropriate examinee conduct;
- ownership of the GED® test, and of all test-related records by GED Testing Service LLC; and
- privacy policies describing the collection, processing, use and transmission to the United States of my personally identifiable data (including the digital photograph, palm vein, signature and audio and video recording collected at the GED® test center), and describing the disclosure of such data to GED Testing Service®, its service providers, any score recipient and others as necessary to prevent fraud or other unlawful activity or as required by law;

I understand and agree if I provide false information or if I violate any GED® rules or procedures, which include, but are not limited to, cheating; altering or misusing documents; attempting in any way to get advance information about the GED® test from any source; sharing information about GED® test questions or content in any way; attempting to remove questions or any notes relating to the GED® test from the testing room; leaving the testing room without permission; or creating a disturbance in the testing room, then any one or more of the following may happen:

- the Exam Administrator may immediately dismiss me from the testing room;
- my GED® test score may be canceled, without a refund, and the jurisdiction receiving my scores may be informed of the reason for the cancellation;
- I may be prevented from retaking the GED® test; and
- I may face civil or criminal prosecution.

I understand and agree the GED® test center may use GED® testing information and may share that information with GED Testing Service®. I acknowledge and consent that GED Testing Service LLC is permitted to use any of my personal information or GED® test data collected from my prior GED® registration and/or testing and combine and use the previously collected information with the information and test results collected for this GED® test as GED Testing Service LLC deems reasonable. I understand that to transfer my GED® scores from one jurisdiction to another jurisdiction or to transfer my scores to any other third party, it is my responsibility to obtain, complete and provide to GED Testing Service® any forms, authorizations, consents, certifications or other requirements to permit release of my test score(s). I hereby consent to GED Testing Service® releasing my GED® test information as I have authorized. GED Testing Service® does research about the GED® test and test-takers, but does not allow your private information to be identified in that research. Sometimes the law requires GED Testing Service® to provide private information, and sometimes GED Testing Service LLC has to investigate fraud or other violations using some private information. I give GED Testing Service LLC and Pearson VUE my permission to retain and transmit my personal data and test responses to GED Testing Service LLC and Pearson VUE, both of which are headquartered in the United States, and which may be outside the country in which I am testing.

You may ask questions about the GED Testing Service® policies at help@GEDtestingservice.com or 1-800-62-MYGED (1-800-626-9433).

APPENDIX F:

Permission to Use Material from *MIS Quarterly* in Dissertation Research

APPENDIX F

PERMISSION TO USE MATERIAL FROM *MIS QUARTERLY*

MIS
Quarterly Carlson School of
Management University of
Minnesota
Suite 4-339 CSOM
321 19th Avenue South
Minneapolis, MN 55455

December 19, 2014

Tanya D. Thomas
Assessment Services Coordinator
Ogeechee Technical College
One Joseph E. Kennedy Blvd.
Statesboro, GOA 30458

Permission to use material from
MIS Quarterly in Dissertation Research

Permission is hereby granted for Tanya D. Thomas to use material from "Computer Self-Efficacy: Development of a Measure and Initial Test," Deborah R. Compeau and Christopher A. Higgins, *MIS Quarterly* (19:2), June 1995, pp. 189-211, specifically the research model and additional reference material as needed, in her doctoral dissertation, tentatively titled "Computer Self-Efficacy of GED Examinees and GED Test Results," being completed at Valdosta State University.

In addition to the citation information for the work, the legend for the material should include Copyright © 1995, Regents of the University of Minnesota. Used with permission. Permission to use this adaption also extends to distribution of the dissertation through ProQuest Information and Learning in electronic format, and to any academic journal articles resulting from the dissertation.

Janice I. DeGross
Manager

APPENDIX G:

Descriptive Statistics for Computer Self Efficacy Survey

APPENDIX G

DESCRIPTIVE STATISTICS FOR COMPUTER SELF EFFICACY SURVEY

	Survey Items	*n*	*M*	*SD*
Hardware Subscale				
Q1.	I feel confident copying information from the computer drive to an external flash drive.	100	1.81	1.089
Q2.	I feel confident in saving or deleting information using a floppy disk.	100	2.29	1.380
Q3.	I feel confident using a computer keyboard.	100	1.23	.566
Q4.	I feel confident using the Universal Serial Bus (USB) port on a computer.	100	1.55	.989
Q5.	I feel confident setting up a computer network in my home.	100	1.69	1.012
Q6.	I feel confident about inserting a compact disc (CD) into the proper computer drive.	100	1.38	.736
Q7.	I feel confident about using a printer to make copies of my work on the computer.	100	1.31	.581
Q8.	I feel confident setting up a new computer system right out of the box.	100	2.12	1.297
Q9.	I feel confident understanding typical computer words for hardware, such as plug-and-play (PnP) devices.	100	2.42	1.342
Q10.	I feel confident about shutting down a computer system.	100	1.23	.566
Q11.	I feel confident using a computer mouse to point or click on the computer screen.	100	1.14	.403
Q12.	I feel confident using a computer modem to connect a computer to the Internet.	100	1.49	.916

	Survey Items	*n*	*M*	*SD*
Software Subscale				
Q1.	I feel confident using a computer operating system (such as Windows or Apple.	100	1.42	.915
Q2.	I feel confident using software to learn how to do new things on a computer.	100	1.71	.868
Q3.	I feel confident about installing a software program correctly.	100	1.99	1.087
Q4.	I feel confident using computer software (such as Excel) to analyze data (numbers).	100	2.26	1.276
Q5.	I feel confident using computer software to add or delete information from a file I have created.	100	1.61	1.014
Q6.	I feel confident using the menu options from within a software program.	100	1.74	1.060
Q7.	I feel confident using antivirus software on a computer.	100	1.74	.981
Q8.	I feel confident playing games on a computer.	100	1.50	1.010
Q9.	I feel confident responding to a dialog box within a software program.	100	1.95	1.149
Q10.	I feel confident starting or quitting a computer software program.	100	1.64	.990
Q11.	I feel confident using a computer software program (such as Word) to write a report.	100	1.43	.856
Q12.	I feel confident using computer software to manage file storage on a computer hard drive.	100	1.78	1.115

	Survey Item	*n*	*M*	*SD*
Internet Subscale				
Q1.	I feel confident in knowing how to set up a computer connection to the Internet.	100	1.46	.915
Q2.	I feel confident knowing how to download files from the Internet.	100	1.63	.906
Q3.	I feel confident knowing how to read an Internet address.	100	1.37	.720
Q4.	I feel confident knowing how to set up an electronic mail (e-mail) account on the Internet.	100	1.38	.814
Q5.	I feel confident in knowing how to use a personal identification number (PIN) to access an Internet account on the computer.	100	1.46	.744
Q6.	I feel confident in knowing how to send attachments to others over the Internet.	100	1.54	.937
Q7.	I feel confident in knowing how to maintain personal information on the Internet.	100	1.51	.772
Q8.	I feel confident in knowing how to manage cookies (small personal files) on the Internet.	100	2.42	1.241
Q9.	I feel confident knowing how to use a computer to search for information at the library.	100	1.43	.795
Q10.	I feel confident using the computer to go online.	100	1.19	.486
Q11.	I feel confident using an Internet browser (such as Internet Explorer) to access the World Wide Web (WWW).	100	121	.537
Q12.	I feel confident using a search engine (such as Google) to find information on the Internet.	100	1.22	.613

APPENDIX H:

Factorial ANOVA Summary Table for the Dependent Variable
Reasoning Through Language Arts

APPENDIX H

FACTORIAL ANOVA SUMMARY TABLE FOR THE DEPENDENT VARIABLE REASONING THROUGH LANGUAGE ARTS

Source	*Type III SS*	*df*	*MS*	*F*	*p*	Partial η^2	η^2
Age							
Age	97.847	2	48.924	1.027	.365	.039	.028
CSES	481.518	2	240.759	5.054	.010*	.165	.138
Age x CSES	465.232	4	116.308	2.442	.058	.161	.133
Error	2429.458	51	47.636				
Corrected Total	3751.333	59					
Gender							
Gender	36.505	1	36.505	.613	.437	.011	.009
CSES	429.720	2	214.860	3.610	.034*	.118	.116
Gender x CSES	23.745	2	11.872	.199	.820	.007	.006
Error	3214.026	54	59.519				
Corrected Total	3751.333	59					
Ethnicity							
Ethnicity	243.670	4	60.918	1.376	.256	.101	.081
CSES	184.309	2	92.155	2.082	.136	.078	.061
Ethnicity x CSES	389.110	4	97.277	2.198	.083	.152	.130
Error	2168.714	49	44.259				
Corrected Total	3751.333	59					
SES							
SES	153.796	3	51.265	.869	.463	.048	.040
CSES	399.105	2	199.553	3.382	.042*	.115	.106
SES x CSES	130.155	2	65.078	1.103	.340	.041	.034
Error	3068.577	52	59.011				
Corrected Total	3751.333	59					

* = significant at the .05 level

APPENDIX I:

Factorial ANOVA Summary Table for the Dependent Variable Social Studies

APPENDIX I

FACTORIAL ANOVA SUMMARY TABLE FOR THE DEPENDENT VARIABLE SOCIAL STUDIES

Source	*Type III SS*	*df*	*MS*	*F*	*p*	Partial η^2	η^2
Age							
Age	206.469	2	103.234	.643	.533	.044	.038
CSES	337.213	2	168.606	1.050	.363	.070	.629
Age x CSES	314.544	3	104.848	.653	.588	.065	.058
Error	4497.542	28	160.626				
Corrected Total	5161.556	35					
Gender							
Gender	318.455	1	318.455	2.154	.153	.067	.062
CSES	236.872	2	118.436	.801	.458	.051	.046
Gender x CSES	65.148	2	32.574	.220	.804	.014	.012
Error	4436.100	30	147.870				
Corrected Total	5161.556	35					
Ethnicity							
Ethnicity	770.305	3	256.768	1.807	.170	.167	.156
CSES	47.790	2	23.895	.168	.846	.012	.009
Ethnicity x CSES	270.677	3	90.226	.635	.599	.066	.054
Error	3835.578	27	142.058				
Corrected Total	5161.556	35					
SES							
SES	144.399	2	72.199	.448	.643	.030	.027
CSES	416.673	2	208.336	1.292	.290	.082	.078
SES x CSES	52.726	2	126.363	.784	.466	.051	.009
Error	4676.000	29	161.241				
Corrected Total	5161.556	35					

APPENDIX J:

Factorial ANOVA Summary Table for the Dependent Variable Science

APPENDIX J

FACTORIAL ANOVA SUMMARY TABLE FOR THE DEPENDENT VARIABLE SCIENCE

Source		*Type III SS*	*df*	*MS*	*F*	*p*	Partial η^2	η^2
Age								
	Age	42.455	2	21.227	.564	.576	.045	.033
	CSES	256.483	2	128.241	3.406	.050	.221	.201
	Age x CSES	71.571	2	35.785	.950	.401	.073	.056
	Error	903.624	24	37.651				
	Corrected Total	1311.419	30					
Gender								
	Gender	15.789	1	15.789	.399	.533	.016	.011
	CSES	290.612	2	145.306	3.675	.040*	.227	.220
	Gender x CSES	24.575	2	12.287	.311	.736	.024	.018
	Error	988.500	25	39.540				
	Corrected Total	1311.419	30					
Ethnicity								
	Ethnicity	102.180	4	25.545	.646	.635	.105	.081
	CSES	200.410	2	100.205	2.535	.102	.187	.159
	Ethnicity x CSES	82.903	2	41.451	1.049	.367	.087	.066
	Error	869.479	22	39.522				
	Corrected Total	1311.419	30					
SES								
	SES	1.587	3	.529	.017	.997	.002	.001
	CSES	330.057	2	165.028	5.406	.012*	.311	.257
	SES x CSES	217.708	1	217.708	7.131	.013*	.229	.169
	Error	732.665	24	30.528				
	Corrected Total	1311.419	30					

* = significant at the .05 level

APPENDIX K:

Factorial ANOVA Summary Table for the Dependent Variable Mathematical Reasoning

APPENDIX K

FACTORIAL ANOVA SUMMARY TABLE FOR THE DEPENDENT VARIABLE MATHEMATICAL REASONING

Source	*Type III SS*	*df*	*MS*	*F*	*p*	Partial η^2	η^2
Age							
Age	72.126	2	36.063	.524	.600	.050	.038
CSES	240.720	2	120.360	1.749	.199	.149	.129
Age x CSES	170.542	4	42.635	.620	.654	.110	.091
Error	1376.056	20	68.803				
Corrected Total	1919.034	29					
Gender							
Gender	33.686	1	33.686	.517	.479	.022	.018
CSES	150.338	2	75.169	1.155	.333	.091	.081
Gender x CSES	165.362	2	82.681	1.270	.300	.099	.089
Error	1497.294	23	65.100				
Corrected Total	1919.034	28					
Ethnicity							
Ethnicity	293.788	3	97.929	1.603	.217	.179	.154
CSES	167.081	2	83.541	1.368	.275	.111	.087
Ethnicity x CSES	101.876	1	101.876	1.668	.210	.070	.053
Error	1343.603	22	61.073				
Corrected Total	1919.034	28					
SES							
SES	18.155	2	9.078	.131	.878	.011	.009
CSES	233.606	2	116.803	1.683	.208	.128	.121
SES x CSES	74.102	1	74.102	1.068	312	.044	.038
Error	1596.114	23	69.396				
Corrected Total	1919.034	28					

APPENDIX L:

Valdosta State University Institutional Review Board Protocol Exemption Report

APPENDIX L

VSU IRB PROTOCOL EXEMPTION REPORT

Institutional Review Board (IRB)
for the Protection of Human Research Participants

PROTOCOL EXEMPTION REPORT

PROTOCOL NUMBER: IRB-03164-2015 **INVESTIGATOR:** Tanya D. Thomas

PROJECT TITLE: Computer Self-Efficacy of GED Examinees and GED Test Results

INSTITUTIONAL REVIEW BOARD DETERMINATION:

This research protocol is exempt from Institutional Review Board oversight under Exemption Category(ies) :1&2. You may begin your study immediately. If the nature of the research project changes such that exemption criteria may no longer apply, please consult with the IRB Administrator (irb@valdosta.edu) before continuing your research.

ADDITIONAL COMMENTS/SUGGESTIONS:

Although not a requirement for exemption, the following suggestions are offered by the IRB Administrator to enhance the protection of participants and/or strengthen the research proposal:

NONE

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

Elizabeth W. Olphie 2/10/15

Elizabeth W. Olphie, IRB Administrator Date

Thank you for submitting an IRB application.
Please direct questions to irb@valdosta.edu or 229-259-5045.

Revised: 12.13.12