Walden Dissertations and Doctoral Studies

2017

The Effect of GED Candidate Race and Motivation Factors on Exam Outcomes

Kathi L. Middleton
Walden University

Walden University

College of Education

This is to certify that the doctoral dissertation by

Kathi Middleton

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Carol Watson, Committee Chairperson, Education Faculty
Dr. Susan Kushner Benson, Committee Member, Education Faculty
Dr. Shereeza Mohammed, University Reviewer, Education Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2017

Abstract

The Effect of GED Candidate Race and Motivation Factors on Exam Outcomes

by

Kathi Linn Middleton

MA, Keller Graduate School, 2006

BS, DeVry University, 2003

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Educational Technology

Walden University

August 2017

Abstract

Earning a General Educational Development (GED) credential can have positive results

in a student's life including higher wages and better job opportunities. The 2014 version

of the GED exam changed the format from a paper-based test to a computer-based test.

This change coincided with a 35% decline in the pass rate indicating not all students are

prepared to pass the new computer-based test (CBT). The purpose of this quantitative

study was to evaluate the influence of a candidate's race and reason for taking the exam

on the pass or fail outcome of the new computer-based GED exam. The study used

Vroom's expectancy theory as the theoretical framework. The guiding question was to

examine the relationship between a candidate's motivation and pass or fail outcome of

the CBT. This study used a quantitative approach to analyze available archival data from

The Technical College System of Georgia in 2014 and 2015. Two chi-square analyses

were conducted on data from 21,641 participants using candidate's race, reason for taking

the exam, and GED pass or fail outcome. Results suggested that individually, both a

candidate's race and reason for taking the test have a statistically significant effect on the

participant's pass or fail outcome. Results from this study may help GED educators and

students better understand factors that can influence student success. Integrating career

development orientations and remedial computer based technology classes into the GED

preparation process were recommended. Implications for positive social change include

the potential to increase student motivation, improve the preparedness of both students

and educators and subsequently increase the number of people who pass the GED exam.

The Effect of GED Candidate Race and Motivation Factors on Exam Outcomes

by

Kathi Linn Middleton

MA, Keller Graduate School, 2006

BS, DeVry University, 2003

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Educational Technology

Walden University

August 2017

Acknowledgments

I would first like to give all honor and glory to God - for He makes all things possible. I could not have completed this journey without my parents, Alfred and Carolyn Middleton; my praying mother devotedly supported me at every step of this process, and my father continually imparted to me that I was destined for greatness. To my greatest cheerleader, my darling daughter Christina, your faith and support in me was most important. To my soulmate, Tobi, I am grateful for the encouragement and patience you lovingly provided. To my family pastor, C. Shaemun Webster, I thank you for your consistent prayers and support. To my dear girlfriends, Erin and Sonya, thank you for your constant encouragement and prayers. I also acknowledge a host of family, friends, mentors, colleagues, and cohorts, for their prayers, words of encouragement and patience throughout this journey. I would like to extend sincere gratitude to the Technical College System of Georgia team, Dr. Serena Walker, Latanya Overby, and Jignesh Bharucha who willingly provided their expertise, time and support for this study. In conclusion, I thank God for such an esteemed dissertation committee including my dissertation chair, Dr. Carol Watson; my methodologist, Dr. Susan Kushner Benson and the URR team who provided unlimited guidance, support, and wisdom to ensure that my research met the highest academic standards. My journey reinforced that the race is not given to the swift nor the strong, but to those who endure to the end.

For I know the plans I have for you," says the LORD. "They are plans for good and not for disaster, to give you a future and a hope.

Jeremiah 29:11

Table of Contents

iv

List of Tables

List of Figures

Chapter 1: Introduction to the Study

The rapid rate of technology innovation is revolutionizing society, business, education, and social connections. From the connected car to Apple Pay and Smartboards, technology is integrated into every aspect of life. With the proliferation of smart devices and computers, more companies are managing job applications, service reservations, and payments online. With so many changes, computer skills are no longer a luxury. To meet the United States' projected job demands, students must obtain 21st century literacies. The Jobs Council Recommendations (2015) reported that by 2020, the United States is expected to have 1.5 million too few college graduates to meet employment demands. Conley (2007) asserted that college readiness is contingent on students developing key cognitive strategies in high school; however, teachers and school administrators often neglect this skills due to the focus on high-stakes standardized testing preparation. Studies show that high-stakes testing is not always effective and may be detrimental to the learning process. Darling-Hammond and Adamson (2010) claimed that when educators teach specifically to the content of high-stakes tests, students are frequently unable to transfer their knowledge into other formats or settings. Au (2013) said that high-stakes testing is not objective and masks race and class inequalities in the United States.

In 2010, President Obama called on the U.S. Department of Education Office of Technology to develop a National Educational Technology Plan (NETP) that would include standards and assessments to measure 21st century competencies and expertise (NETP Technical Working Group, 2010). The standards and assessments include critical

thinking, complex problem-solving, and collaboration and multimedia communication in all content areas (NETP Technical Working Group, 2010). The Obama administration has made education a priority and created a goal that by 2020, the proportion of college graduates with 2-year or 4-year degrees will increase to 60% of the population, compared to 39% in 2010 (NETP Technical Working Group, 2010). Job applicants will need to acquire basic computer skills and obtain their high school equivalency, at a minimum, to enter college. A high school diploma is the most commonly held credential in the United States (Clark & Martorell, 2014). Utilizing data from the U.S. Department of Education, Greene and Forster (2003) reported that only 70% of students enrolled in high school. Various reasons contribute to 30% of students not earning their high school diplomas in traditional high school settings. Barton (2005) reported that the combination of three factors—socioeconomic characteristics, the number of parents living in the home, and a history of changing schools—are frequently associated with completion rates across states. DePaoili (2013) reported that in 2013, the high school graduation rate hit a record high of 81.4%. The research shows that these gains are attributed to rising graduation rates among populations that had higher rates of failure previously, including low-income and minority students.

There are other options for obtaining a standard high school diploma to meet college entry requirements and improve workforce readiness skills. The General Educational Development (GED) credential is not equivalent to a high school diploma; however, it is widely recognized as an alternative (Tuck, 2012). In the past 73 years, more than 17 million adults—or one of every seven Americans—have successfully

completed the exam (GED Testing Service [GEDTS], 2013). Twelve percent of high

school credentials are GEDs (Murnane, 2013). Since the GED's inception in 1942, there

have been five generations of the test, released in 1942, 1978, 1988, 2002, and the latest

in 2014, to correspond with the evolution of testing and societal changes (GEDTS, 2013).

The fifth revision of the GED exam, released on January 2, 2014, focuses on

career- and college-readiness (GEDTS, 2015a). This latest version retires the paper-

based test (PBT) and introduces the computer-based test (CBT) and aligns the content

with the new high school curriculum and math and English standards (McNeil, 2011).

Kuzmina (2010) noted that there is significant value in computer-based assessments,

including reduced testing time, improved test security, rapid feedback, and better

availability; however, test administrators should closely monitor student performance

when the computer-based assessment is introduced to ensure the requirements are in

place to support success (Brown, Race, & Bull, 1999). Ricketts and Wilks (2002)

suggested that careful consideration goes into the computer screen design of the

assessment, as this component can heavily influence students' performance. It is also

important that educators and administrators are prepared for the new technology

considerations in the learning and assessment process.

Test taker motivation plays an integral role in the GED exam outcome. In

addition to assessing a candidate on the core subject areas, the exam collects general

profile information on the GED candidates including their intrinsic and extrinsic

motivational factors for taking the test to support the programs' success. In Georgia, a

test takers' response to their reason for taking the exam is identified as either personal

gain, work related, educational gain, special requirement, or military entrance (see

Appendix). Cinar, Bektas, and Aslan (2011) asserted that if organizations understand

what drives an employee, the job assignments and rewards can be set to encourage these

people. Motivation is an aspect of most of life's endeavors, and is increasingly important

in second chance opportunities such as the GED program. Understanding the role that

candidates' motivation factors play in exam performance creates an opportunity to

educate and tailor GED exam and preparation programs to prepare students for success.

 The purpose of this study is to evaluate the influence of a candidate's race and

reason for taking the exam on the pass or fail outcome of the new computer-based GED

exam. Understanding the influences of success in the CBT mode is increasingly

important given the drastic decline in the pass rates since the GEDTS released the new

2014 series. Researchers have conducted many studies to determine the best methods for

transitioning exams to a computer-based format and the role of the educator in the

process (Burke, 2010; Gehring, 2002; Higgins, Patterson, Bozman, & Katz, 2010; Tran,

2013).

 With the explosion of technology in social, business, and education settings and

the movement toward computer-based testing, researchers have yet to determine the

impact of test takers' motivation factors on success with the new test. Identifying the

reasons for a decline in the GED participation and pass rates with the release of the fifth

computer-based edition of the GED test is imperative to provide solutions that can

influence student success and, in turn, meet the needs of the learners, educators, and

society. This study was designed to evaluate the influence of a candidate's race and

reason for taking the exam with the pass or fail outcome of the new computer-based GED exam.

The research problem was identified to discover factors that influence the pass or fail outcome on the new computer-based GED exam. Research questions were established to further illuminate the problem and purpose of the study. The theoretical framework of the expectancy theory and the modified expectancy theory were used to guide the study. The nature of the study, all pertinent definitions, assumptions, scope, delimitations, and limitations were discussed. Finally, this chapter explained the significance of the study and its role in positive social change.

Background of the GED

Burke (2010) asserts that the technological age has changed every aspect of life and work. Burke further expounded that student training and the role of the educator are instrumental factors in preparing students to properly utilize the increasing amount of information in the technology age to achieve business success. Earning a high school equivalency credential through the traditional or GED route can significantly impact a person's quality of life. In 2013, the average earnings of high school graduates ages 25 to 64 were $30,000, compared to $23,900 for high school dropouts and $48,500 for college graduates (Stillwell & Stable, 2013). However, despite evidence that a high school diploma increases earning potential, many employers say that high school graduates lack basic grammar, writing, and math skills. The American Diploma Project (2004) reported that one study estimated that the cost of remedial training in core competencies for a single state's employers was near $40 million a year. The goal of the fifth CBT edition

of the GED is to assess and measure a student's 21st century job skills, which are required for today's workforce.

The American Council on Education (ACE) developed the GED program in 1942 to certify that veterans returning from World War II without conventional high school diplomas had the same cognitive skills possessed by students who obtained high school diplomas (Tyler, 2005). From 1943 through 1946, the test was only administered to veterans; attaining the GED credential was important to veterans who sought to take advantage of the postsecondary education benefits the GI Bill afforded to them (Tyler, 2005). In 1947, New York became the first state to administer the test to non-veterans seeking the GED credential after leaving high school (Tyler, 2005). From 1963 to 1970, high school drop rates increased drastically, with more than 300,0000 dropouts attempting the exam in 1970, compared to 88,000 in 1963 (Tyler, 2005). In the 1970s, the GED test became more accessible when states began to lower the age restrictions to take the exam to 16 or 18; previously, individuals had to be at least 20 years old to take the exam (Heckman, Humphries, LaFontaine, & Rodriguez, 2012). Since the GED's inception in 1942, five generations of the test have been released, with versions in 1942, 1978, 1988, 2002, and the latest in 2014, to keep up with the evolution of secondary testing (GEDTS, 2013).

For over 70 years, the GED test has been widely recognized for demonstrating that a student's knowledge is equivalent to that of a high school graduate. The GED test focused on higher-level thinking and measuring the use of information as opposed to recollecting information (Bingham, 2002). The GEDTS must regularly update the GED

test with new standards to maintain the test's relevancy and legitimacy. In 2002, NCE modified the GED test to incorporate the use of a calculator and used business language throughout all five test areas (Bingham, 2002).

As part of the GED 21st Century Initiative, an effort to raise the test's standards to ensure that those who pass the exam are on par with traditional high school graduates and support college readiness, the GEDTS transformed the fifth edition of the GED test (Tran, 2013). The 2014 series test incorporated the Common Core State Standards that K–12 schools across the country have widely adopted to prepare students for college. Schools in 46 states and the District of Columbia have now adopted the Common Core state standards, which aim to improve high school graduates' readiness for college and careers (Rothman, 2012). The test now provides a score for college readiness in addition to indicating high school–level academic competency (Tran, 2013). The 2014 GET test merged the Language Arts Reading and Writing subjects into Reasoning through Language Arts. 2014 GED test covers the following four subjects:

- Reasoning through Language Arts.

- Mathematical Reasoning.

- Social Studies.

- Science.

Although the subjects included on the test have not changed much since the inception of the test over 70 years ago, the content has evolved to align with changes in the workplace and higher education (Sharpe & Reddy, 2014). Seventy years ago, computers and other new age information technologies were scarce. Computers, tablets, and smartphones are

now everywhere, and few jobs exist that do not require the employee to have some familiarity and knowledge with technology (Sharpe & Reddy, 2014). To address this change, one of the biggest variations in the 2014 test is that it is computer-based, replacing the previous paper-based testing versions.

The GEDTS is following the movement of many test administrators away from PBTs and toward CBTs. Higgins et al. (2010) reported that 26 states and the District of Columbia were planning to administer some form of computer-based state exams in 2008–2009. In a 2006 survey, more than two-thirds of candidates desired to take the GED test on a computer rather than on paper (George-Ezzelle & Hsu, 2006). In addition to encouraging GED test takers to develop 21st century career and college-readiness skills, the new test has improved access for test takers registering for and scheduling the test, streamlined administrative work for educators, provided same-day score reports, and improved the overall security of the test (GEDTS, 2015a). However, despite the benefits, there are hurdles to overcome in transitioning to the new test that includes lack of technology accessibility, limited computer knowledge, and increased costs.

The GEDTS offers the new test solely on computers, and some adult educators are arguing that students without ready access to computers will struggle to learn the basic mechanics of maneuvering through the test (Kiener, 2014). The new test is more expensive than the prior versions. In some states, such as Massachusetts, the cost has nearly doubled, going from $65 to $120 (Kiener, 2014). The price that test takers pay is set by jurisdictions and varies from jurisdiction to jurisdiction. Many adults are taking

the GED test to earn a better job and the increased cost of the new computer test creates a financial hardship.

The price increase is primarily attributed to a change in governance. The GED test ownership has been under the nonprofit American Council of Education (ACE) for the past 70 years, and with the 2014 upgrade, ownership transferred to a privately owned company, Pearson VUE. With the price increases, several states are now allowing students to choose among other high school equivalency tests, including the Educational Testing Service (ETS) HiSET and the Data Recognition Corporation/CTB TASC Test Assessing Secondary Complete (Zinth, 2015). Wyoming Community College offers the paper-based versions of the HiSET and TASC, which are $50 compared to the GED test cost of $120. Lipke and Farrell (2014) speculated that the new test series would have long-term costs to support the transition including overhead associated with software and technology updates.

The new technology delivery method for the GED test creates a new experience in preparing, administering, and scoring the test. Some educators argue that the new computer-based GED test is disadvantageous for those test takers seeking a GED for entry-level jobs that require few to no computer skills. Despite varying opinions on the need for the CBT transition, the U.S. Bureau of Labor Statistics has estimated 1.4 million new computer science jobs are coming by 2020, with only 400,000 computer-trained candidates to fill these roles, identifying a significant gap in the computer-skilled workforce (Miller, 2014).

The number of people both registering for and earning a GED credential in 2014 dropped significantly with the introduction of the computer-based exam. In 2014, approximately 248,000 people took the test, and of this number, only 86,000 successfully earned their GEDs. In 2013, there were 800,000 test takers, and nearly 560,000 passed the exam (Mulhere, 2015). With the number of GED graduates dropping out, and focus on ensuring that the workforce has technological readiness to meet the job demands of 2020 heightening, researchers have yet to determine the impact of technology integration on the GED CBT. Identifying the influences is imperative to fully understand the impact of the new computer delivery model and more rigorous content.

Problem Statement

A growing change in business communication and learning environments led to the release of the fifth revision of the GED test on January 2, 2014, with a focus on career-and college-readiness. The GED assessment was established 73 years ago and has remained relevant and a widely recognized test for demonstrating high school skill equivalency in students who do not obtain high school diplomas in traditional settings. Approximately 750,000 high school dropouts attempted the GED test annually to improve employment and educational opportunities (GEDTS, 2013). As technology continues to evolve, exam updates are necessary to ensure candidates' career readiness for today's technology-centered workplaces. The fifth version of the test retired the paper format and transformed the evaluation experience by introducing a computer-based exam that aligns content to new high school curriculum and math and English standards (McNeil, 2011).

While youth are immersed in technology within the secondary classroom setting, adult learners typically advance in technology by way of programs to meet workplace requirements, nurture interests, or support their children's education. According to Ginsburg, Sabatini, and Wagner (2010), teachers can use technology as a catalyst for learning, particularly for learners who are less apprehensive about their technology literacy. To succeed in the 21st century workplace job applicants are encouraged to advance their computer-based skills and obtain their high school equivalencies, at a minimum. By default, the new test assesses technology aptitude, which can present challenges for GED candidates with limited exposure to technology. According to the GEDTS (2013), 75% of the 850,000 GED candidates passed the 2002 series exam. Following the release of the 2014 computer-based exam, the number of people registering for and earning a GED in 2014 dropped significantly, with less than 40% of the approximately 248,000 GED candidates passing the exam (Mulhere, 2015). As of January 27, 2016, the GEDTS had not yet published the official annual statistics report for the introductory 2014 CBT series. Previous transitions to new test series have resulted in a decline in the number of test takers for the initial year, yet the pass rates remained consistent during those changes (GEDTS, 2015a).

The analysis of the GED candidate's race and reason for taking the test seeks to determine influences on the new computer-based GED exam pass or fail outcome. It is important to understand the factors that influence a candidate's success to maintain or increase the GED pass rate. Increasing GED success is critical considering the decreasing number of GED graduates and the heightened focus on ensuring that the

workforce has the technological readiness to meet the job demands of 2020. Although there is comprehensive research on the GED program, computer based testing success factors, and student motivation, limited if any research has examined the integration of these factors and the impact they may have on the GED pass rate. Researchers have yet to determine the impact of motivation factors, technology integration, and other possible influences on candidates' success on the computer-based GED test. This study was limited to evaluating the influence of a candidate's race and reason for taking the exam on the pass or fail outcome of the new computer-based GED exam. This research created an opportunity to identify influences that significantly impact GED candidates' exam pass or fail outcomes.

Purpose of the Study

The purpose of this quantitative study is to evaluate the influence of a candidate's race and reason for taking the exam on the pass or fail outcome of the new computer-based GED exam. The study results may be useful for adult educators to understand better variables that influence GED pass or fail outcomes. This information can be used to improve GED preparatory programs and better prepare students for success.

Research Questions

The following three research questions and hypotheses guided this study:

Q1: Is there a statistically significant relationship between a candidate's race and the GED pass or fail outcome?

$H_0$1: There is no statistically significant relationship between a candidate's race and the GED pass or fail outcome.

H_a1: There is a statistically significant relationship between a candidate's race and

the GED pass or fail outcome.

Q2: Is there a statistically significant relationship between a candidate's

motivation and the GED pass or fail outcome?

H_02: There is no statistically significant relationship between a candidate's

motivation and the GED pass or fail outcome.

H_a2: There is a statistically significant relationship between a candidate's

motivation and the GED pass or fail outcome.

Q3: Can a candidate's race and motivation reason predict a GED pass or fail

outcome?

H_03: A candidate's race and motivation reason can predict a GED pass or fail

outcome.

H_a3: A candidate's race and motivation reason cannot predict a GED pass or fail

outcome.

The dependent and independent variables are listed below.

The independent variables:

- Candidate's reason for taking the exam: personal gain, work related,

  educational gain, special requirement or military entrance

- Candidate's race: Black or African American, White, Asian, American

  Indian or Alaskan Native American, Native Hawaiian or Other Pacific

  Islander

The dependent variable was the pass or fail outcome of the GED exam.

Conceptual Framework

The purpose of this study was to evaluate the influence of a candidate's race and reason for taking the exam on the pass or fail outcome of the new computer-based GED exam. GED administrators held the assumption that GED test takers enrolled to take the exam to achieve a perceived employment, social, or personal reward, including obtaining job advancement or employment or meeting college requirements. This study employed the expectancy theory to examine the relationships.

The expectancy theory, originally developed by Vroom (1964), asserts that the strength of force necessary for an individual to perform an act is the combined function of three major components: valence, expectancy, and instrumentality. The theory posits that there is a relationship between effort and performance (expectancy), performance level and reward (instrumentality), and satisfaction of the reward (valence). Expectancy is one's personal temporary belief that an amount of effort will enable him or her to perform at the desired level (Tien, 2000). Research has proven that instrumentality and valence alone can adequately predict motivation and performance (Galbraith & Cummings, 1967; Mitchell, 1974; Schmitt & Son, 1981).

This study uses the following operational definitions:

- Instrumentality represents one's perception of the degree to which the performance of an action will lead to the reward (Tien, 2000). For this study, instrumentality is represented as the GED candidates' pass or fail outcome,

which determines whether they are awarded GED credentials (see available data variables for further details).

- Valence refers to one's preference for the reward (Tien, 2000). For this study, valence is represented as the GED candidates' motivational factors for obtaining GED credentials (see data variables for further details).

The modified expectancy theory regards an action as a means of obtaining a reward (Tien, 2000). This action is expressed as the first-level outcome, while a reward is referred to as the second-level outcome. According to this view, employment, personal, and social advancements (rewards) are the long-term goals for individuals. Passing the GED exam (first-level outcome) is a way to obtain the advancement reward (second-level outcome). This theory posits that if a person does not value the long-term reward, he or she will not work hard to pass the GED exam (Beck, 2003). The following formula can represent the motivation or reason to take the GED exam, which the personal gain, work related, educational gain, special requirement, or military entrance factors drive:

- $Mx = VxLx$.
- Mx = Reason to take the GED exam for personal gain, work related, educational gain, special requirement or military entrance motivational factors
- Vx = Valence of employment, social, and personal motivational factors.
- Lx = Instrumentality of obtaining a pass outcome on the GED for personal gain, work related, educational gain, special requirement or military entrance factors.

Nature of the Study

The nature of this study was quantitative. Quantitative research serves as an appropriate means of examining the relationship between motivational factors for taking the GED test and pass rate variables (Creswell, Hanson, Plano, & Morales, 2007). Using existing data, a statistical analysis was performed to determine if there is a relationship between candidates' motivations for obtaining GED credentials and pass rates across both the previous paper-based and the current computer-based modes of the GED test. The study focused on the candidate's race and reason for taking the GED exam and the pass or fail outcome of test takers utilizing the CBT format.

Data analysis included data from the GED Testing Service Annual Statistical Report, including but not limited to the pass or fail outcome of first-time GED candidates who took the computer-based exam in 2014 and 2015. In addition to the pass or fail exam outcomes, the candidates' race and reason cited for GED candidates taking the computer-based exams were included. The participants for this study were a part of the data sets.

The design of the study was guided by three research questions that examined the relationship between a candidate's race and motivation on the pass or fail outcome of the CBT. The study utilized secondary data provided by the Technical College System of Georgia (TCSG), which included information on the participants that took the GED exam in the 2014 and 2015 calendar years. The information included the dependent variable, pass or fail outcome, and the two independent variables, ethnicity and reason for taking the test. Data from 21,641 participants were analyzed, and statistical inferences were drawn, with no need for sampling, as data came from an existing database

Definitions

The following definitions are provided to ensure context and understanding for the terms used throughout the study.

21st century skills: Knowledge to analyze information, evaluates its usefulness, and create new knowledge from the known information (Silva, 2008).

Computer-Based Test (CBT): A test that is presented in an electronic format for which the test delivery provider specifies the test design and procedures, including but not limited to the administration process, time limit, scoring method, and reporting of results (Sireci & Zenisky, 2006).

Computer Literacy: A subskill of the 21st century skill set that defines the knowledge of information science skills, advanced computer skills, and Internet communication skills (Silva, 2008).

General Education Development (GED) Exam: An exam consisting of five sections: math, science, reading, social studies, and writing. Those who pass the exam earn the GED Certificate, which is widely accepted as a high school equivalent (Sharpe & Reddy, 2014).

GED Candidate: GED test taker who meets the age requirements to complete the GED test (Tyler, Murnane, & Willett, 2004).

High School Equivalency: A status used to describe credentials earned by a person who either graduated from a traditional high school or obtained an alternative credential such as a GED (Heckman & LaFontaine, 2010).

Paper-Based Test (PBT): A test that is presented on printed paper and completed with a pencil or pen (Sireci & Zenisky, 2006).

Pass Rate: Percent of GED test takers who successfully pass the test (Tyler et al., 2004).

Readiness: Fundamental assessment to determine preparedness to complete a testing component (Gomez, Wu, & Passerini, 2010).

Traditional High School Graduate: A high school graduate who receives a traditional high school diploma from an accredited high school program (Heckman & LaFontaine, 2010).

Assumptions

Assumptions refer to prior learning that can be unconscious for a researcher when conducting a study (Creswell et al., 2007). Assumptions of the study are as follows:

GED test takers provide accurate information regarding their race and reason for taking the computer-based exam.

Scope and Delimitations

This study evaluated the influence of a candidate's race and reason for taking the exam on the pass or fail outcome of the new computer-based GED exam. In large-scale CBT implementations, test developers and implementers should be thoroughly assessing the old and new assessments to ensure test takers and administrators can succeed in the new system (Achieve, 2010). The motivational factors for taking the GED exam were selected as the focus of the study to identify challenges and opportunities for success in passing the GED CBT. Understanding the threats, strengths, and variables that impact

the CBT program will allow improvement recommendations to be made that will increase the participation and pass rates of the GED and subsequently increase the number of skilled workers with 21st century job skills to close the employment gap.

Literature covering the GED program, expectancy theory, computer-based testing, workplace technology needs and GED educator challenges was reviewed. The literature review of computer use and academic achievement provided contrary results, as some researchers believed that an increase in the use of computers in the secondary classroom setting is correlated with higher performance, while other researchers found that excessive use of the computer can be disadvantageous to academic achievement. The studies presented did indicate that employers are seeking employees with practical technical skills, such as those that the latest GED exam evaluates. Taylor, Kirsch, Eignor, and Jamieson (1999) examined the threats present in changing the mode of test delivery, including an inevitable change in the validity of the measure. They asserted that in utilizing a computer for testing, test taker scores reflected not only proficiency in a subject but also computer proficiency. This study provided baseline data on the different factors influencing computer familiarity and the impact that this has on PBT opposed to CBT performance.

While the literature review was extensive and presented numerous studies, a large proportion of studies were over 30 years old. The authors of the literature reviewed did not note whether the scholarship lacked current research on the topics. Tien's (2000) assessment of the expectancy theory was leveraged to determine if there is a correlation between GED candidates' motivation factors for taking the GED exam and pass rates.

This research provides a conceptual framework for understanding how motivation is measured using a construct which includes anticipated outcome (valence) and performance level to achieve a reward (instrumentality). Studies have found that students who can transfer their cultural capital into the classroom are likely to influence a teacher's perception of their abilities. This philosophy also attributes cultural activities with educational success, indicating that these experiences increase a student's aptitude for success in the classroom.

The large majority of the referenced literature on computer-based testing was newly published within the last 13 years. The student's level of computer familiarity was integral in understanding the disadvantages that test takers may face in a computer-based exam mode. It was also posited that reading comprehension may vary across test modes and that students may not understand what the scores mean. Before implementing a CBT mode, administrators should understand the role that computer proficiency has on achievement, including possible impacts that the test mode has on the teacher's evaluation of the student. Given the proliferation of computers in the classroom, teachers may have preconceived expectations of students' abilities to use technology. As such, the research suggested that computer proficiency will positively affect teachers' evaluations with consideration given to other controlling variables.

Limitations

The primary limitation of this research study is related to the utilization of secondary data for analyses. This limitation resulted in the analysis of only the GED candidate's motivation for taking the exam; there are likely other factors that contribute

to a test taker's pass or fail outcome. Therefore, the generalizability of this study and its findings is limited. Nevertheless, this limitation does not invalidate the results of the study. An additional limitation pertains to the participant pool being limited to Georgia; the inclusion of other states could produce a different racial and academic makeup and variance in the factors that influence pass or fail outcomes.

Significance of the Study

Significance to Practice

One of the key factors of success for adults is obtaining a high school diploma. The rapid rate of innovation has dramatically changed the definition of a high school equivalency and workforce readiness (Sharpe & Reddy, 2014). The GED has undergone five revisions since its inception in 1942 to keep up with rapid changes in society. The NCE developed the first-generation 1942 series during the industrial era when a high school equivalency degree demonstrated that the recipient possessed the necessary skills for most jobs (GEDTS, 2014). The NCE introduced the 1978 series as a result of educators and employers recognizing that memorization of information would not serve a future generation in the workplace because rapid innovation was on the rise (Sharpe & Reddy, 2014). The 1988 series reflected a shift to the beginning of the Information Age, in which technology required more emphasis on critical thinking and societal awareness. More than 65% of candidates took the test for entry into postsecondary education, compared to 30% who took the test for workforce readiness (GEDTS, 2014). The 2002 series updated the content to resemble the evolution of high school curriculum to prepare students for workforce readiness. Perhaps the greatest change since the 1978 series, the

2014 series introduced new content that aligns with the Common Core standards and changed the exam format from a PBT to a CBT (GEDTS, 2015a). This study is important to understand the factors that influence the pass or fail outcome on the new CBT. Understanding these factors may better prepare students and educators to achieve success on the new test offered solely on the computer.

Significance to Theory

In the literature review discussed in Chapter 2, the challenges faced by GED educators in preparing GED test takers were examined. The outcome of this study may be useful to administrators and test takers in numerous aspects, including the improvement of the GED curriculum development, exam preparation classes, and administration of the exam. The GEDTS (2015b) identified that preparedness is a key factor in testing success. The goal of this study was to evaluate the influence of a candidate's race and reason for taking the exam on the pass or fail outcome of the new computer-based GED exam. Understanding the influence of a candidate's race and reason for taking the exam on the pass or fail outcome of the new computer-based GED exam may identify factors that could help to improve the CBT pass rate. The expectancy theory posits that there is a relationship between effort and performance (expectancy), performance level and reward (instrumentality), and satisfaction of the reward (valence). Understanding the student's value with a pass or fail outcome is significant to the theory, as this may help to understand the role of valence in the expectancy theory.

Significance to Social Change

The exploration of a possible relationship between a candidate's race and reason for taking the GED exam and their pass or fail exam outcome contributes greatly to scholarship. This research study evaluated the influence of a candidate's race and reason for taking the exam on the pass or fail outcome of the new computer-based GED exam. The study may be able to make suggestions for improving test preparation and increasing the pass rate.

Understanding the variables that impact the pass or fail outcome on the CBT is increasingly important to ensure test takers are prepared to pass the test and thus are equipped with the 21st century job skills needed for the surge in computer jobs expected over the next five years. Because the number of workers ages 55 and up is expected to increase to 103 million by 2025, educating adults who may have limited exposure to computers to pass the GED CBT is increasingly important (Lee, Czaja, & Sharit, 2009). Also, evaluating the influence that sociocultural factors have on a pass or fail exam outcome is important to address educational gaps. In addressing the educational gaps, GED test takers could be better prepared for the exam, increase chances of passing, and be able to obtain better jobs for themselves and family, promoting positive social change.

Summary and Transition

To ensure that GED test takers are equipped with the fundamental 21st century job skills required for today's careers and colleges, the test has undergone a major change by introducing computer-based testing. This study attempts to examine GED candidates' motivational factors for taking the CBT to support testing success and close the

employment gap for skilled workers with 21st century job skills. This chapter included

the problem, introduces the research questions, presents key definitions, and discusses

limitations and assumptions. In Chapter 2 the literature review provides an in-depth

overview of the GED program, computer-based testing, expectancy theory, and

workplace technology needs.

Chapter 2: Literature Review

Introduction

The content of the literature review for this study focuses on understanding the GED program, computer-based assessments, and factors that impact students' success on the GED CBT. Additional research is included in the conceptual framework for Vroom's expectancy theory and workplace technology needs. Existing research on technology acceptance in e-learning environments has established that the user's perceptions of ease of use and usefulness are central factors in predicting a student's acceptance of new technology, according to Martins and Kellermanns (2004) and Ngai, Pool, and Chan (2007). Understanding the GED setting and internal and external variables that impact student motivation is the focus of the literature review.

Many studies focus on information technology (IT) acceptance factors in e-learning environments; however, there is limited research on student success factors with computer-based assessments. Thus, I reviewed journal articles, book chapters, and government reports as well as non-scholarly works such as newspaper articles, computer test manuals, and preparatory guides to gain as much insight as possible into the relationship between student motivation factors and achievement on the new GED assessment. The research services and databases that I used include ERIC, Google Scholar, Academic Search Computer, SAGE Journals, Walden 360 Link, Education Research Complete, Dissertation Abstracts, and PsycINFO. I used the following search terms to conduct research for this literature review: *computer-based assessments*,

computer-based testing, *expectancy theory*, *student technology acceptance factors*, *GED*, and *high school completion rates*.

The literature review covers the following topics: The GED Exam section offers insight into the history of the exam, including the current CBT version; the current computer-based exam (v5) section provides an overview of computer-based testing, including students' perceptions, challenges, and advantages; the theoretical framework section presents the expectancy theory for understanding student motivation factors; the race, motivation, and test performance section provides insight into the impact of race on student performance; the workforce challenges section discusses the workplace technology needs of the 21st century, and the GED educator challenges section provides insight into the challenges that educators are facing with the new exam. Socioeconomic factors are discussed throughout the literature review as influencers that impact student motivation and achievement.

GED Exam

The GED exam is designed to test knowledge in four test subjects: Reasoning through Language Arts, Science, Mathematical Reasoning, and Social Studies (GEDTS, 2015a). The test content corresponds to the knowledge areas in which graduating high school students in the United States and Canada are required to demonstrate proficiency (Ezzelle & Setzer, 2009). The test is offered in 50 states, the District of Columbia, eight insular areas, 13 Canadian provinces and territories, and various federal institutions such as U.S. military bases, the Federal Bureau of Prisons, Michigan prisons, and Veterans Affairs hospitals (Achieve, 2010; Ezzelle & Setzer, 2009). The cost is between $0–$40

per test subject depending on the state. Over 20 million people have taken the exam, with approximately 17 million passing, since the test's inception over 72 years ago (GEDTS, 2015a). Ninety-eight percent of colleges and universities and 96% of companies that require a high school diploma accept the GED credential to meet acceptance criteria (GEDTS, 2009). The GED continues to be a meaningful credential for both individuals seeking to improve the quality of their lives and entities seeking to substantiate applicants' qualifications.

There have been five series of the test, each introducing key changes to maintain the validity and relevance of the exam. The American Council on Education (ACE) developed and administered the GED from 1942 until 2011, when it entered a collaboration with Pearson to form the GED Testing Service (GEDTS), which now is the sole developer of the test. There have been five series of the test: the 1942 series, the 1978 series, the 1988 series, the 2002 series, and the current 2014 series (Tyler, 2005). Changes throughout each series have been made to add value to the test and demonstrate its relevance and credibility in an evolving world.

History of the GED

At the request of the military, in 1942 the ACE introduced the first series of the GED test to assist World War II veterans with completing their high school studies to resume civilian life (GEDTS, 2014). During this time, progressive education enthusiasts focused on general education rather than curricular knowledge, as the thinking was that general education was more practical. In 1946, the ACE, which sponsored the GED, found that the exam was fitting for those outside of the military; New York became the

first state to offer the test to nonveteran adults (Ezzelle & Setzer, 2009). By 1954, about 42,000 people in the United States had taken the GED (GEDTS, 2014). During the 1950s, approved testing facilities offered the GED test to anyone who had not graduated from high school; by 1959, more civilians were taking the GED test than veterans (Heckman, Humphries, & Mader, 2010).

The original 1942 series of the test remained in use for 36 years. The exam included five tests: Correctness and Effectiveness of Expression, Interpretation of Reading Materials in the Social Studies, Interpretation of Reading Materials in the Natural Sciences, Interpretation of Literacy Materials, and General Mathematical Ability (Ezzelle & Setzer, 2009). The entire test took approximately 10 hours to administer (Ezzelle & Setzer, 2009). Today the military continues to offer the GED test to men and women who desire to enlist in the army, as high school equivalency remains a requirement.

By the 1970s, all 50 states were offering the GED exam, and the number of test takers steadily increased year after year; California became the last state to introduce the GED in 1974 (Heckman et al., 2010). In the 1980s, there was an increase in available funding for GED preparation courses, attributed to an increase in the number of test takers to 700,000 (Tyler, 2005). In 1978, the ACE introduced the second series of the GED test and administered this version for the next eight years. With more civilians now taking the test, a committee of high school curriculum specialists defined the specifications for the second-series test (Ezzelle & Setzer, 2009).

The exam included five tests, entitled The Writing Skills Test, The Social Studies Test, The Science Test, The Reading Skills Test, and The Mathematics Test (Ezzelle & Setzer, 2009). These tests continued the emphasis on demonstrating high school equivalency and added practical life aspects to the questions. The ACE enhanced the test with current reading material, including newspapers, to make the exam questions related to the business world of that time (Ezzelle & Setzer, 2009). This series of the test took approximately 7 hours to complete; The ACE extended the time for the writing skills and mathematics tests shortly after the tests were rolled out (Ezzelle & Setzer, 2009).

The ACE introduced the third series of the GED test in 1988. In 1982, there was heightened awareness of the shift from an industrial- to information-based society (Auchter, 1998). The GED administration responded to this change and began a 5-year review process to assess the current second series of the GED test. The assessment revealed that the academic content was sound and five changes were recommended: adding a writing sample, increasing the emphasis on critical-thinking and problem-solving skills, reflecting the diverse roles that adults play in society, placing greater emphasis on understanding the drivers behind changes in society, and increasing the information related to everyday life (Ezzelle & Setzer, 2009). The GEDTS reported that in 1997, the number of candidates that took the test to continue their education was 70%, nearly double the 37% of the 1970s (Auchter, 1998). The third series of the exam included five tests, entitled "Writing Skills," "Social Studies," "Science," "Interpreting Literature and the Arts," and "Mathematics," and took approximately 7 hours and 45 minutes to complete (Ezzelle & Setzer, 2009). Auchter (1998) found that the current

GED measured almost all the essential skills employers valued except for speaking and leadership functional skills.

In the 1990s, the GEDTS spearheaded studies comparing national and state standards of graduating students to prepare the educational and public communities for the fourth series of the GED (Ezzelle & Setzer, 2009). In 2002, the ACE introduced the fourth series of the GED with new areas that emphasized critical thinking, communication, and information processing (Auchter, 1998). The fourth series of the exam included five tests, entitled Language Arts/Writing, Social Studies, Science, Reading, and Mathematics, and took approximately 7 hours to complete (Ezzelle & Setzer, 2009).

The "Language Arts/Writing" section consisted of two parts: multiple choice questions and a written essay. The first part required the examinee to demonstrate the ability to revise and edit workplace materials by answering 50 multiple-choice items within a 75-minute time limit. The second part assessed the examinee's ability to write an essay using personal experiences within a 45-minute time limit. Both parts were combined and reported as one single score. The social studies test measured an examinee's knowledge of U.S. history, world history, civics and government, geography, and economics. This portion of the test included 50 multiple-choice items and had a time limit of 70 minutes. The Canadian version of the social studies tests included much of the U.S. version as well as Canada-specific government, civics, and history content (Ezzelle & Setzer, 2009). The science test measured an examinee's knowledge of life science, physical science, and Earth and space science. This portion of the test included

50 multiple-choice items and had a time limit of 80 minutes. The scoring scale ranged

from a minimum of 200 to a maximum of 800; about two-thirds of all U.S. high school

seniors earned standard scores between 400 and 600 (Ezzelle & Setzer, 2009). The 2002

test series did not include any items that directly addressed or required computer literacy;

however, questions about the importance and impact of technology appeared throughout

the test (Ezzelle & Setzer, 2009).

The Current Computer-Based Exam (Volume 5)

To address the changing business world and align to new rigorous high school

standards, in 2014, the GEDTS introduced the fifth series of the GED test. The latest

exam iteration retired the previous PBT format and introduced the CBT mode with new

content aligning to the Common Core skills (Hoffman, Wine & McKinney, 2013). In the

70-year history of the GED test, the fifth version is the most significant upgrade

(GEDTS, 2014). The test is administered entirely on a computer and assesses four

content areas: Reasoning through language arts, mathematical reasoning, science, and

social studies. The three products of the test include the following:

- An assessment of whether a candidate is eligible to receive his or her state's high school–level credential.

- Insightful feedback about a candidate's abilities relative to career- and college-readiness based on his or her exam performances.

- Prescriptive information to inform and guide the candidate's further study and preparation if an exam retake is required.

To achieve these goals, the GEDTS established performance standards by analyzing multiple data sources, including test taker performance data, test taker outcomes following the passing of the GED test, and policy implications (GEDTS, 2014). With the fifth series of the test, the GEDTS eliminated the 2002 series compensatory scoring model that required a test taker to obtain a minimum score on each subject area and earn an overall average score. The fifth version of the test established a simple assessment with three performance levels to assess each of the four content areas. The first performance level, Below Passing, denoted that a candidate has not achieved a required passing score and had earned a scaled score of between 100 and 149. The second performance level, Passing Standard, permitted the award of a high school equivalency credential based on a candidate's achieving a scaled score of between 150 and 169. The third performance level, GED Score with Honors, reflected performance that was suggestive of college- and career-readiness with a scaled score between 170 and 200.

Following the establishment of the initial performance levels, the GEDTS established a process to monitor their pertinence. This monitoring program was imperative because of older adults' limited exposure to the more rigorous performance and graduation standards. Despite the known hindrances, the GEDTS, along with the jurisdictional advisors, closely monitored student performance on the GED exam without taking immediate action to allow adequate observation. With the introduction of any new standardized test, initial scores are typically lower than historical averages.

The monitoring of the performance data revealed two key areas of interest. The first phenomenon was that test takers were consistently scoring from 1 to 5 scale points below the passing standard. These test takers consistently demonstrated the competencies throughout the test when simpler stimulus materials or situations were used but were unable to do so with more challenging real-world scenarios. The second phenomenon was related to candidate testing attempts and completion rates. The goal of the fifth version was to increase access by widening the assessment goals; however, in 2014 and 2015, the percentage of test takers that enrolled and completed the test decreased (59% compared to the previous average of 70%) (GEDTS, 2014). Consequently, the GEDTS modified the initial performance levels and introduced new performance levels in January 2016, based on an analysis of test performance in 2014 and 2015 (GEDTS, 2014). The high-end scores of the Below Passing and Passing Standard performance levels were lowered by 5 points, making 145 and higher a passing score. The implemented performance levels are as follows, (GEDTS, 2014):

- Performance Level 1: Below Passing (100–144 scaled score points)

- Performance Level 2: Pass/High School Equivalency (145–164 scaled score points)

- Performance Level 3: GED® College Ready (165–174 scaled score points)

- Performance Level 4: GED® College Ready + Credit (175–200 scaled score points)

In addition to changes in the performance levels, there were also content changes. The current exam increases reading expectations, focus on higher order thinking skills,

and stimulates more real-world content, calibrating the exam with the present digital age. The latest test is aimed at preparing candidates for career and college readiness (GEDTS, 2015a). Several knowledge areas are new in the 2014 testing series; however, there is a lot of carryover skills assessment from the 2002 series. In addition to the content and the transition to the computerized test for all GED test takers, the test includes new item formats, and the extended response task for the essay is different from that of the 2002 series. An example of a new item format is that the reading test uses a 60-40 split-screen to allow reading passages to appear on the left side and supporting items to be included on the right side. Figure 1 depicts the split screen layout that is displayed primarily on the Reasoning Through Language Arts Test (GEDTS, 2012). The fifth series test also now offers a 10-minute break during the module.

GED Layouts - Candidate Name   ⊜ Question 11 of 15 (MCsplit)
🖹 Comment   ⚐ Flag for Review

Spain has opened the first 24-hour industrial scale solar thermal plant.

The concept is very different from what most people think of as solar power. Most people think of solar panels. These produce electricity by exciting a compound with sunlight and that excited compound causes electrons to flow, producing electricity. This process is called photovoltaics.

Solar thermal is very different. By concentrating the sunlight reflecting off thousands of mirrors onto a small area results in that area getting very, very hot. By capturing and storing that heat, the facility can use the heat to boil water, producing steam and generating electricity using standard steam turbines.

This has several advantages over photovoltaics. The first is simplicity. Steam driven turbines are a well understood technology. People trained in energy production from other sources (coal, gas, and nuclear) can transfer their skills. Also, the sunlit part is only mirrors, not solar panels or other high-tech system, just simple mirrors.

Second, the system generates a lot of heat. In reality, every energy system in use today is based around capturing the work done by flowing heat energy. Basically, heat moves from hot things to cold things until they are the same temperature. Work is done by capturing that flow of heat and transforming some of it into a different form of energy (electricity or the motion of cars). The greater the temperature difference, the better for capturing the energy.

Third, it is possible to store heat. That is the real trick to this system. It uses a salt (not table salt, a chemical salt) that is heated to the melting point by the solar mirrors. The salt is the heat storage system. Since the salts used (potassium nitrate and sodium nitrate) melt between 304°C and 334°C (that is 579°F and 633°F) they can turn water into very high pressure steam easily.

These salts also retain that heat very well. This Spanish system is rated for electricity production for 15 hours even without any sunlight. It retains up to 99%

From the information given, which statement describes an advantage of solar thermal power plants for developing countries?

○ A.   Many developing countries are near the ocean and have a ready supply of salt for use in a solar thermal plant.

○ B.   Solar thermal plants can store heat for long periods of time, so developing countries have a constant supply of power.

○ C.   Many developing countries are in warm climates and a solar thermal plant can generate more electricity when it is hot.

○ D.   Solar thermal plants are relatively simple, so developing countries do not have to have a complex infrastructure to build this kind of plant.

                                                        ← Previous   Next →

Figure 1. Multiple choice items and a passage split screen.

Although ACE offered the 2002 test series in both the paper-based and computer-based formats, many test takers continued to take the PBT. With the new 2014 series, a minimal number of PBTs are administered to test takers with disabilities. The switch to a CBT transforms the test taker's experience throughout the life cycle of the exam. First, the exam registration is fully available online, allowing the test taker to search for a convenient location and book a testing time from the comfort of his or her couch. Second, the test taker takes the complete exam on a computer at an approved testing facility. Last, the test taker receives his or her score report on the same day that he or she completed the test. These enhancements streamline and add efficiency to the registration,

scheduling, testing, and scoring processes. These new digital procedures also increase security by minimizing the likelihood that test takers will improperly release test items (Hoffman et al., 2013).

There are known advantages to administering and taking the GED test online; however, GED candidates must meet new essential conditions to ensure success. By default, basic computer literacy skills are required to navigate through the computer-based test mode. The minimum computer skills required for the 2014 GED 2014 test included the ability to scroll, click and drag, cut and paste, and use an on-screen calculator (Hoffman et al., 2013).

The GEDTS offers a tutorial for the computer-based test on its website. The objective of the tutorial is to provide a simulation that allows test takers to practice with GED-test–specific computer functionality. It is imperative that adult programs consider the additional technology training that will be required to support the shift to the CBT. GED training programs will need to integrate additional training and practice time into preparatory classes to support test takers with the required computer literacy knowledge and experience. The GEDTS conducted pilot tests prior to the inception of the CBT mode to determine the equivalency of the CBT and PBT testing scores.

GED Validity and Reliability

The Standards for Educational and Psychological Testing define validity as the degree to which accumulated evidence and theory substantiate interpretations of test scores for use on a specified test (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014).

There are three purposes of the GED test: (a) provide a high-school level credential, (b) provide candidate information on strengths and development opportunities and (c) provide evidence of readiness to enter workforce training or postsecondary education (GEDTS, 2014b). In 2009, GEDTS staff and experts conducted reviews of the newly released Common Core state standards and identified the core standards that an adult learner must demonstrate to be awarded a high school equivalency credential. GEDTS does not report raw scores; instead, raw scores are converted to the previously described standard score scale for ease of interpretation.

Reliability refers to the consistency of the test scores over repetitions. For example, if the GED test yields widely diverse scores for the same tests-taker on separate test administrations, and the individual has not changed significant, then the scores are not reliable (GEDTS, 2014b). The GEDTS understands the significant role that reliability holds in demonstrating test quality. There are several procedures used to evaluate and account for reliability including internal consistency and decision consistency. Consistency coefficients are used to measure internal consistency in each section of the GED test. Decision consistency reflects the consistency in a which a test taker is categorized in a scoring category (GEDTS, 2014b). The GEDTS adheres to the scoring model utilizing the three classifications based on two benchmarks: the high school credential and GED with Honors.

GED Administration

Like the tests of many other programs, the GED test is administered at local testing centers (Ezzelle & Setzer, 2009). The administration of the GED test is a shared

responsibility between the GEDTS and the participating authorities in each state that administers the test. The scoring of the test is decentralized; each jurisdiction is responsible for accurate scoring. All GED administrators must follow the GEDTS scoring standards and the GED Examiner's Manual (Ezzelle & Setzer, 2009). The GEDTS offers several safeguards to ensure test security, and the approved testing facilities that administer, score and oversee the GED test decide which to implement (Ezzelle & Setzer, 2009).

The biggest threat to test security is that the questions on the GED test may be exposed (Ezzelle & Setzer, 2009). Several preventative measures are in place to mitigate this risk. During the test development stage, the GEDTS requires content authors to sign confidentiality agreements. During the administration phase of the test, the test forms are cycled both within and across years. Examinees who retake the GED test within the same year are not administered the same test form (Ezzelle & Setzer, 2009).

The GEDTS has participated in several studies to calibrate the GED test to ensure the exam evaluation measures align to traditional high school diploma measures. In 1992, the GEDTS partnered with the Educational Testing Service (ETS) in a comparison study using an external measure, the National Adult Literacy Survey Scale (NALS), to assess the English language skills of test takers who had failed and passed the exam (Auchter, 1998). The 1992 study found that higher scores on the GED were akin to higher scores on the NALS; however, earning a moderate pass rate of the GED did not connote the ability to be able to perform the range of complex literacy tasks needed to compete and function in a global society (Auchter, 1998). In 1994, ACE revised the

GED passing score to improve the score alignment to the NALS literacy rating. In 1993, Auchter and Skaggs conducted a second study that compared 1993 graduating seniors at specified letter grade levels (A–F) with those who achieved selected standard scores. This study revealed that a significant percentage of graduating seniors with Cs or lower grades would not pass the test. The results of this study led to ACE raising the standard for passing the GED test, effective January 1997, to better discriminate among students with letter grades differing from A through F (Auchter, 1998).

The State Board approves fee schedules for taking the GED test, a retest of one or more components, for a replacement of the GED, or for an Official Report of test scores. The GED test measures many of the U.S. Department of Labor's required workplace skills that are desired by employers. The GED measures the skills and knowledge that a traditional high school senior would know and can demonstrate. In 2012, 16,336 Georgia test takers completed the GED test. In 2013, 18,611 Georgia test takers completed the GED test. In 2013, education motivational factors were the motive candidates cited most often for taking the GED test. The number of test takers typically increases at the end of a test revision cycle and declines on the onset of a new test.

GED Preparation

Volunteer and non-profit organizations typically administer GED preparation courses and are often underfunded. Ryder and Hagedorn (2012) provided insight into GED preparation within the community college setting and how students achieve their GEDs and transition to postsecondary opportunities. At the time of their writing, the 2002 series was the most recent version, and both the full technical specifications and the

questions designs were available to assist with preparation. In most states, local government agencies measure noncredit education concerning contact hours, if it is tracked at all, due to the lack of a data management process. Subsequently, such as is the case in Iowa, there is little emphasis on analytic data regarding GED preparation hours. All adult and development educational courses that students use to prepare for the GED fall under the non-credit umbrella. Not providing credit for these courses could be a deterrent to a student who needs a GED preparation course but is not able to see the immediate benefit of attending such a course.

Computer-Based Testing

Assessments are an integral part of student learning and are used to measure a student's abilities (Joosten-ten Brinke et al., 2007). Computer-based tests have become popular in the United States thanks to their enhanced abilities to utilize information and communication technology to automate student assessments. There are known benefits to computer-based testing, including cost and time reductions, the speed of results, and automatic record management. The National Assessment of Educational Progress (NAEP) has been in existence for over 40 years and is the largest nationally represented assessment of American student abilities across multiple subjects. Over the past few years, the NAEP has begun the transition from a paper-and-pencil-based format to digitally based assessments and intends to be fully digital by the end of the decade to support the changing educational landscape (NAEP, n.d.). CBTs can be used in a variety of contexts, including both formative and summative assessments. Summative assessments help to establish whether students have attained the goals set for them.

Formative assessments provide specific feedback for students to take remedial action to help them attain their goals (Birenbaum, 1996; Economides, 2006; Economides, 2009; Moridis & Economides, 2009).

Computers enhance productivity by manipulating information more quickly and cheaply than manual activity can (Negroponte, 1995). In the United States, since 1995, companies have been leveraging the benefit of technology to increase productivity and raise profits by utilizing online stores, online exchanges, and e-learning and e-support services. In addition to improving efficiency, technology makes it possible to connect many customers in a personalized way. Customers can use the Internet to order equipment, design products, and customize clothing. As the value of technology for business continues to increase, the demand for computer-skilled workers will increase as well. Seven years ago, 96% of working Americans used new communications technologies as part of their daily lives, while 62% of working Americans used the Internet as an integral part of their jobs (Deighton & Quelch, 2009). According to a study by the Department of Commerce (2011), between 1998 and 2008, the number of domestic IT jobs grew by 26 percent, four times faster than U.S. employment. By 2018, IT employment is expected to increase by another 22%. With the rapid rate of increase in technology in the business and social worlds, people must know how to use technology to work and learn. Therefore, technology aptitude has become an essential skill that must be taught and measured for effectiveness.

Bennett (2006) theorized that the proliferation of computer-based testing is not only an effect of evolving technology in the workplace; it is also a result of the demand

for information resources to which technology provides access. The infusion of technology into the educational system will result in extrinsic and intrinsic changes in the way that a student's aptitude is assessed (Bennett, 2006). A large number of computer-based exams are being administered today. As technology continues to advance the way that students learn, schools will need to enhance efforts to further facilitate learning and instruction in ways that PBT assessments are limited. Over the past decade, many occupational, professional, and postsecondary exams have transitioned to a computer-test mode, including the College Level Examination Program® (CLEP®), the Graduate Record Examinations® General Test (GRE®), the Graduate Management Admission Test® (GMAT®), the National Council of State Boards of Nursing NCLEX® Examination, the Test of English as a Foreign Language® (TOEFL®), and the United States Medical Licensing Examination™ (USMLE™). The collective experience of these programs is that computer delivery presents considerable challenges (Wainer & Eignor, 2000).

There are challenges with the computer-based test mode. Many states are offering assessments in both paper-based and computer-based test modes to accommodate locations that are not able to implement the computer technology. In instances where a facility administers both the paper-based and computer-based test, there are often limitations in making the content analogous across both test versions. The desire to achieve consistency across both paper-based and computer-based test in the interim is understandable. However, this aim may limit the ability of testing agencies to

broaden measurements on the technology assessments to further assess 21st century skills and abilities.

The implementation of computers for assessments and education creates new opportunities for technology issues. When a computer crashes or is unavailable, facilities may not have access to technical staff to address the issue. In March 2015, Alaska suspended a computer-based statewide standardized test that was being used to assess third- to tenth-graders due to technical issues. A construction incident interrupted the exam when a fiber optic cable that provided internet service to the University of Kansas where the test was being managed was damaged. This incident disrupted testing in Alaska and Kansas, along with hospital computers that were also relying on the network (Hanlon, 2016).

Computer-based assessments present security challenges that are like those found in the paper-based testing mode. However, the means for compromising test data vary with the computer access mode. Testing facilities must ensure that hackers do not compromise sensitive test data stored on computers by putting the necessary encryption, firewalls, and software controls in place. Once exam data are compromised, they can easily be exploited around the world. Computer-based testing in K–12 programs does not necessarily present a greater security threat than PBTs. However, it does present a unique challenge in ensuring that staff is prepared to safeguard the assessment data with the new digital methods of detection and prevention.

Theoretical Framework

The purpose of this study is to evaluate the influence of a candidate's race and reason for taking the exam on the scores of the new computer-based GED exam. The expectancy theory provides a framework for understanding the relationship between motivation factors and a student's performance level on the GED computer-based assessment. The theory, originally developed by Vroom (1964), asserts that the strength of force necessary for an individual to perform an act is the combined function of three major components: valence, expectancy, and instrumentality. The expectancy model was selected for this research study because the construct had a strong theoretical basis for the test setting, as described below.

The theory posits that there is a relationship between effort and performance (expectancy), performance level and reward (instrumentality), and satisfaction of the reward (valence). Expectancy is one's personal temporary belief that an amount of effort will enable him or her to perform at the desired level (Tien, 2000). Research has proven that instrumentality and valence alone can effectively predict motivation and performance (Galbraith & Cummings, 1967; Mitchell, 1974; Schmitt & Son, 1981). The expectancy theory is often referred to as the VIE theory, signifying valence, instrumentality, and expectancy. Many studies focus on IT acceptance factors in e-learning environments; however, there is limited research on student success factors for computer-based assessments. Terzis and Economides (2011) argued that the development of a successful computer-based test is contingent on students' acceptance of the testing experience.

Sanchez, Truxillo, and Bauer (2000) suggested that understanding test-taking motivation factors go beyond the relationship between test-taking motivation and test performance. Test-taking motivation is impacted by other variables, including ethnic differences, test validity, and student perceptions of content. The researchers developed a 10-item multidimensional measure of test-taking motivation based on the expectancy theory and conducted assessments of 90 students. The study indicated that expectancy was related to actual test performance. For the study, valence represented a job, instrumentality was performance, and expectancy was the belief that performance would result in the job.

Moore and Davies (1984) suggested that the primary value in assessing student's expectancy would be to administer counseling with GED candidates, particularly for those with a low level of expectancy. The researchers performed a regression analysis study on 74 disadvantaged or disabled students in a GED class to determine if GED scores could be predicted from Vroom's expectancy-valence theorem. The study was not able to prove a relationship between expectancy and GED test scores.

A study by Terzis and Economides (2011) explored the factors affecting students' acceptance of CBT test modes. They surveyed 173 first-year students enrolled in an introductory informatics course, who took both theory and practice computer-based assessments. The study found that the following eight variables explained 50% of behavioral intentions: perceived ease of use, perceived playfulness, perceived usefulness, computer self-efficacy, social influence, facilitating conditions, content, and goal expectancy. Terzis and Economides (2011) introduced two new constructs: goal

expectation, which measures the students' pre- and post-assessment experiences, and content, which examines the usefulness and clarity of the questions. The study found that goal expectancy is defined by a student's ability to maneuver through the test and understand the questions. Careful consideration of students' abilities and aptitudes is essential to designing and deploying a solid computer-based assessment.

Race, Motivation, and Test Performance

A level playing field in education is essential to ensure that all students, irrespective of their school assignment, are equipped for success in the current digital age. Inequalities among student groups in academic achievement remains a prevalent challenge that must be explored to improve educational outcomes for students. Arcidiacono and Koedel (2014) completed a study to understand better the racial disparities in four-year college completion rates among African Americans and Whites. Arcidiacono and Koedel (2014) reported that 6-year college graduation rates for African Americans are over 20 percentage points lower than for whites, and examined the factors that might be attributed to the disproportion. In addition to race, the study examined how the choice of major, academic background characteristics and high school quality impacted completion scores. The study concluded that racial differences in graduation rates could primarily be attributed to racial differences and academic preparation among both men and women. Exclusive of race, the most significant student-level predictors of graduation success are high school of attendance and class rank.

Keels (2013) examined the gender and racial or ethnic gaps in college graduation and grades of a 1999 freshman cohort of students attending 24 selective, predominantly

White institutions, and the factors that account for observed gaps. Examining minority

persistence in predominately White institutions (PWI) is important, given that over 83%

of all Black students attend PWI's. The study determined that to improve minority

success, an analysis was needed to extend beyond prior academic preparation to create a

more supportive college experience. Minority students can feel social isolation, stress

and feel more negatively about their environment (Neville, Heppner, Ji & Thye, 2004). It

is important that educators not only focus on students' initial preparedness to succeed but

also the ongoing support needed to face emotional and educational changes.

High-stakes testing has changed the landscape of education for students,

particularly minority students who face obstacles that can hinder success. Understanding

the gaps and opportunities that influence GED success is important to bring to awareness

to educators. Researchers have found that incarcerated adults consistently have lower

educational levels, which is linked to higher illiteracy rates. Because inmates show very

little economic diversity, Burgess Flynn, Moseley and Pippin (2015) explored the

isolated relationships concerning age, race, and gender to GED success. Batchelder,

Flynn, Moseley, and Pippin (2015) posited that higher achievement among Caucasian

inmates was attributed to a lesser amount of misconduct infractions. The study found no

statistically significant differences among the independent variables of race, age, and

gender; however, the findings justify further investigation on race as an isolated

independent variable.

The perceived outcome that a teacher has on a student's abilities and anticipated

performance can impact student success. Burgess and Greaves (2013) examined whether

there are systematic differences between the objective and subjective assessment measures across ethnic minority and white majority students in England. The study found that there were statistically and quantitatively significant differences in the assessments across ethnic groups. For example, 12.4% of white students received a grade from their teacher that is below their final test score; whereas black Caribbean students were 32% more likely to receive this outcome. Burgess and Greaves (2013) argued that influence of poverty and ethnicity are difficult to decouple, and cite that 15% percent of white students are eligible for free school meals, compared to 31% black Caribbean, 42% black African, 35% Pakistani, and 50% Bangladeshi students.

The influence of racial and ethnic identity is multidimensional and can have various meanings and impacts. Sutantoputri and Watt (2012) explored three dimensions of racial and ethnicity character including 1) private regard, 2) ethnic importance and 3) social embeddedness. The goal of the study was to explore the relationship of gender, ethnicity and religion differences on motivational goals, self-efficacy and racial/ethnic identity and academic performance. The findings determined that religion is a critical aspect of the academic setting. Additionally, the study indicated that further ethnical, cultural affiliations might provide insight into how these aspects influence student's motivations.

Próspero, Russell, and Vohra-Gupta (2012) examined the differences in educational motivation among 315 Hispanic and non-Hispanic first-generation high school and college students (FGS). The study found that extrinsic and motivation were significant predictors of grade point averages (GPAs) among FGS compared to intrinsic

motivation. Also, high school FGS and Hispanic students were more likely to report higher intrinsic motivation than college FGS and non-Hispanic students. Minimal research on motivation factors during the transition from high school to college has been conducted. The study revealed that intrinsic motivation differed in Hispanic FGS compared with other ethnic groups. Additional research should be carried out to understand better the environmental factors that attribute to motivation. These outcomes can be used to created targeted programs for mentoring, development and transition to college support.

Awareness of and attention to the patterns and challenges that certain student segments face is vital to equipping educators with the training and tools to improve academic success. There are low-income background schools, like Fredrick Douglas Academy and Thurgood Marshall Academy in Harlem that successfully found ways to create school cultures that increased the success of minority students. In 2011, New York City Mayor Michael Bloomberg and billionaire philanthropist George Soros donated $200 million and redirected $500 million in public funds to a variety of initiatives targeted at addressing the African American and Latino male education crisis (Noguera, 2012). With education and funding, educators and schools have an opportunity to reform the school culture that perpetuates low achievement rates among minority students.

Technology Workforce Gap

Over the last three decades, computerization has radically changed the automobile, telecommunications, and mass production industries, impacting almost every aspect of social and business life. In the past decade, there has been an increasing

amount of research emphasizing the significance of postsecondary education. A 2004

study by labor economists Frank Levy and Richard Murnane demonstrated the changing

impact that computers are having on the employment landscape and suggested that new

skills could be taught to ease the transition into the new job demands. Carnevale, Smith,

and Strohl (2010) projected that in 2018, 62% of U.S. jobs would require postsecondary

education; this is more than a 50% increase since 1973. Despite the job demand increase,

the proportion of college-degreed students in the United States is not rising quickly

enough to meet the demand. In 2011, the United States ranked 15th amid 20 major

industrialized countries for the number of adults (ages 25 to 34 years) with bachelor's

degrees (Carnevale et al., 2010). The lack of post-secondary success has been attributed

to student's insufficient training during high school. In a 2005 survey, U.S. employers

reported that 39% of high school graduates were ill-equipped for entry-level positions.

Correspondingly, 39% of graduates themselves acknowledged that they were not

prepared for college or the workplace (Achieve, 2005). Carnevale et al. (2010) argued

that the government is not using the available data to help people match their education

preparation with their career ambitions and that doing so would help the nation's workers

navigate the transforming business world.

To meet the global demand for a technologically inclined workforce,

organizations like the Partnership for 21st Century Learning (P21) have been partnering

with educators, business leaders, and policy makers for the past decade to define and

establish the criteria for college- and career-readiness (Soulé & Warrick, 2015). Self-

direction, creativity, critical thinking, and innovation may not be new 21st century skills,

but the current technology climate in business means that they are no longer discretionary skills; they are now required for job success.

Despite the changing requirements over the past ten years, student performance has remained inadequate in core competencies, including reading and mathematics. The NAEP is the largest nationally represented assessment of American students' skills and abilities. By 2020, the NAEP intends to have fully migrated all assessments to the computer. The NAEP administered a study by the Institute of Education Sciences and found that less than 40% of fourth and eighth graders achieve proficient scores in reading, science, and mathematics (Hemphill & Vanneman, 2011). These low-performance results are alarming given the worldwide shift to greater reliance on technology in the today's business world.

Outside of the achievement gaps across grades and student performance levels, there are large disparities across racial and economic demographics. For example, in eighth-grade science, 43% of White students are proficient, compared to only 10% of Black students and 16% of Hispanic students. Despite the promotion of and focus on science, technology, engineering, and mathematics (STEM) curriculum to prepare students for the changing workforce, performance continues to suffer in this area, in large numbers for minorities. Another prominent skill set is writing, the importance of which the proliferation of computers and email usage has only heightened. In writing, only 41% of White students and less than 20% of Black, Hispanic, and low-income students reached proficiency in the 2007 NAEP study.

Two phenomena are contributing to the deficit in the technology workforce: the graying of the existing workforce and the explosion of modernized information and communication technology. Tams, Gover, and Thatcher (2014) asserted that the aging trend of the workplace is a current and future issue that is a result of policy changes that make early retirement disadvantageous or, in many cases, impossible for many seniors. In addition, the evolution of job conditions has eliminated a large amount of physical labor, which now increases the lifespan of laborers positions or in general. According to a 2008 U.S. Bureau of Labor Statistics study, the number of workers 65 and older in the United States has increased more than 100% in the past thirty years. Since the older workforce was educated regarding technology when it was less complex, a unique challenge is presented in that the grayed workforce does not can respond to more complex technology (Tams et al., 2014).

There is an inherent difference in the computer education that a recent college graduate has received compared to that of a 65-year-old worker who is a 30-year veteran in his or her job. Even with company training and education, work demands often limit the on-the-job training workers receive compared to dedicated college courses that integrate and instruct on the latest technology. Research reports that computer self-efficacy is lower among older individuals (Czaja et al., 2006; Fisk, Rogers, Charness, Czaja, & Sharit, 2009; Mead, Sit, Rogers, Jamieson, & Rousseau, 2000). Given the significance of age and computer efficacy in the workplace, there are likely to be similar age disparities in computer efficacy as they relate to performance on computer-based tests.

Rising college costs and securing employment after graduation remain barriers for today's young adults; however, research shows that the payoff of completing high school and postsecondary education has both immediate and residual benefits. Bergman, Kong, and Pope (2014) emphasized that an emerging adult's failure to complete high school creates an economic barrier to personal and financial success. Carnevale et al. (2010) quantified the educational shift in the workplace. They found that over the past 30 years, the hierarchical relationship between formal education levels and annual wages has been established among prime-age workers (ages 25 and 54years) with the following trends:

- Earnings of high school dropouts have fallen by 2%.

- Earnings of high school graduates have increased by 13%.

- Earnings of people with some college or an associate's degree have increased by 15%.

- Earnings of people with graduate degrees have increased by 55%.

In addition, figures were provided to assess earning power over a lifetime:

- Having a high school degree is worth about $569,000 more than being a dropout.

- Having some college but no degree attainment is worth about $43,000 more than having a high school degree alone.

- A bachelor's degree is worth about $1.1 million more than an associate's degree.

- A master's degree is worth $457,000 more than a bachelor's degree.

- A doctoral degree is worth about $193,000 more than a master's degree.

- A professional degree is worth about $621,000 more than a doctoral degree.

Higher levels of education and workplace training not only increase job opportunities but also improve the opportunity for educated workers to use technology to enhance their skills rather than be replaced. In contrast, less-educated workers tend to utilize technology that replaces their skills. For example, a data analyst may use an Excel data sheet program to analyze data and make conclusions, whereas a store teller may use a computer program that automatically tabulates a customer's total and processes his or her credit card with minimal manual intervention. Carnevale et al. (2010) found that even high school dropouts who use technology at work earn 15% more than employees who do not use technology. Card and DiNardo (2002) completed a study assessing computer use across education groups and found that high school graduates are three to four times more likely to use a computer on the job than a dropout, and college graduates are about twice as likely to use a computer compared to those with only high school diplomas.

GED Educator Challenges

Brinkley-Etzkorn, & Skolits (2014) explored the GED 2014 test impacts on teachers, staff, volunteers and other GED program stakeholders. A case study was performed focusing on a GED testing preparation site serving young adults 25, to examine the impact on GED programs services in addition to determining GED candidate's perception and impact because of the new test. Understanding the challenges and impacts to GED program staff is imperative to determine how best to serve and prepare this group in supporting the change.

GED services will now be preparing candidates to take the fifth-generation test that is focused on college and career readiness. GED education providers will need to develop new material and instruction approaches to align with the new test content. Many GED teachers are part-time and often volunteers, and may not have the time or incentive to participant in training. Many GED practitioners are not subject to state-mandated certification or professional development requirements (Belzer, 2005). Considering the part-time employment status and professional development is optional it may be difficult to provide an incentive to GED providers to advance their education and curriculum.

A collective vision must be shared across GED program administrators, instructors and candidates to achieve success on the new computer based exam. Understanding the influence of a candidate's race and reason for taking the exam on the scores of the new computer-based GED exam will provide insight into factors that may be helpful to GED instructors. GED program administrators may be able to use this information to develop curriculum and professional development to educate teachers. GED instructors may be able to use this information to equip candidates for success on the exam better.

Literature Review Summary

Since the GED was introduced in 1942, the GED credential was the only option for adults without a high school diploma, who sought employment advancement or postsecondary education (Zinth, 2015). Over the past 70 years, the GED has undergone five revisions to keep up with the skills and knowledge required for society. The latest

version of the GED test was released in January 2014 and introduced new content, cost and delivery method of the nationally recognized standardized test (GEDTS, 2014). The new computer test mode provides immediate and residual advantages such as online registration, real-time test scores, prescriptive feedback and assessment of high school equivalency and college readiness. Despite the benefits, the new test has introduced challenges including financial hardship for those who are unable to afford the increased costs and limitations for candidates who lack technology skills. Fully understanding the opportunities and challenges of Motivation has been considered an important predictor of academic success. However, research on this variable has been minimal and may be attributed to lack of assessment instruments (Moore & Davies, 1984).

The percentage of test takers that enrolled and completed the latest version of the test in 2014 – 2015 decreased (59% compared to the previous average of 70%) (GEDTS, 2014). The reduced number of GED candidates is a national issue. In the past, the GED has been used primarily to meet entrance criteria for low wage jobs. The GED is no longer limited to low wage jobs as the new test assesses both high school equivalency and college readiness. In 2013, 65% of GED recipients indicated that they obtained their credential to pursue further education (GETS, 2014a). The default delivery mode for the GED test is now on the computer. This assessment is critical to determine candidates' 21st century skill set considering nearly 96% of working Americans use new communications technologies as part of their daily lives, while 62% of working Americans use the Internet as an integral part of their jobs (Deighton & Quelch, 2009). With declining GED pass rates and anticipated workforce gaps, understanding how GED

candidate factors impact pass scores is needed. The current literature search on this topic

reached saturation, and the scarcity of studies emphasized the need for this study to be

done. In Chapter 3 the study measurement, methodology for the study, secondary data

collection, and planned analyses of the data are described.

Chapter 3: Methodology

Introduction

In this research, I conducted a secondary data analysis to evaluate the influence of a candidate's race and reason for taking the test on the pass or fail outcomes of the new computer-based GED exam. The goal of the research was to understand better the factors that most significantly influence success for GED candidates completing the current 2014 version of the GED test. The study outcome may be useful for adult educators to understand better variables that influence GED pass of fail exam outcomes. This information can be used to improve preparatory programs and better prepare students for success. This chapter outlines the research design and rationale for the selected design. It includes the research design, study context, population under study, data collection methods, planned data analysis procedures, threats to validity, and ethical procedures associated with the study's design.

Research Design and Rationale

The researcher must pose careful questions in fleshing out the research problem and choosing the appropriate research methodology. Quantitative research focuses on measuring variables and testing hypotheses with unplanned explanations (Sarantakos, 2012). The nature of this study was quantitative. The design of the study was guided by the following three research questions:

Q1: Is there a statistically significant relationship between a candidate's race and the GED pass or fail outcome?

$H_0{}^1$: There is no statistically significant relationship between a candidate's race and the GED pass or fail outcome.

$H_a{}^1$: There is a statistically significant relationship between a candidate's race and the GED pass or fail outcome.

Q2: Is there a statistically significant relationship between a candidate's motivation and the GED pass or fail outcome?

$H_0{}^1$: There is no statistically significant relationship between a candidate's motivation and the GED pass or fail outcome.

$H_a{}^1$: There is a statistically significant relationship between a candidate's motivation and the GED pass or fail outcome.

Q3: Can a candidate's race and motivation reason predict a GED pass or fail outcome?

$H_0{}^1$: A candidate's race and motivation can reason predict a GED pass or fail outcome.

$H_a{}^1$: A candidate's race and motivation cannot reason predict a GED pass or fail outcome.

The study used secondary data from the GED survey questionnaire (see Appendix) to evaluate the influence of a candidate's race and reason for taking the exam on the pass or fail outcome on the new computer-based GED exam. The survey responses and exam outcomes were included in the secondary data made available by the GEDTS. A limitation of designing a study reliant on secondary data is that there are possible anomalies that cannot be completely planned for until the raw data is made

available. Once the data was available, the study methods were adjusted to account for

the raw data variables. The Technical College System of Georgia (TCSG) provided

information on participants that took the GED exam in the 2014 and 2015 calendar years.

The information included the participants' race, motivation reason for taking the exam,

and their pass or fail outcome. The independent variables were the participants' race and

reason for taking the exam. The dependent variable was the students' pass or fail

outcome on the exam. This data relates directly to the research questions, and the

outcome of the data analysis can lead to a better understanding of the impact of the new

computer-based GED exam, for both students and educators.

Success on the new computer-based GED exam can impact the trajectory of a test

taker's future. Social change implications are that more examinees will be able to pass

the GED exam, attend college, and gain improved employment if they are properly

motivated to achieve success. Understanding the influences that impact candidate test

scores on the computer-based test (CBT) is increasingly important to ensure test takers

are prepared to pass the test. The technological age has altered every aspect of life and

work; success on the computer-based GED test allows individuals to demonstrate that

they have acquired the required literacy skills to succeed in the workplace (Burke, 2010).

Methodology

Setting Context of the Study

In research involving secondary data analysis, the traditional concept of "setting"

does not apply. Instead, the context in which the data were collected is more appropriate.

The GED test is developed by the GEDTS; however, TCSG is responsible for providing

adult education at the basic, general, and specialized levels throughout the state of

Georgia. TCSG governs the testing locations to ensure that the facilities are

administering the GED testing program and issuing diplomas in accordance with the

policies established by the ACE. Georgia has over 30 testing facilities servicing over 100

counties throughout the state.

Population

In utilizing the existing data, the entire population of students in Georgia who

were tested in 2014 and 2015 was included and sampling was not required. The

characteristics of this population included those who completed the Georgia GED test

and selected one of the five reasons for taking the GED test. The study was executed to

determine if the difference in GED pass or fail exam outcomes are explained by the

interaction between reasons and race to further determine the impacts of the transition to

the computer-based testing mode. Data from 21,641 participants were analyzed and

statistical inferences were drawn, with no need for sampling, as data came from an

existing database.

Data Collection Procedures

Only one method of data collection was used in this study: retrieval of archival

secondary data (GED candidates' ethnicity, motivation factors, and pass or fail outcome).

This approach in utilizing the original data is appropriate, as according to Church (2002):

Original data is generally needed for in-depth analysis of variables as published

summaries may eliminate key variables from the record. In using the original

data, however, it is possible to examine the dependent variable(s), such as a

student's motivation factor, and their corresponding pass or fail outcome, and

demographics. (p. 40)

It was necessary to obtain Walden IRB approval to conduct this secondary data

analysis. The IRB approval number for this study is 10-14-16-0190418. This approval

confirmed that the study met Walden University's ethics requirements. The following

steps were followed to conduct the data analysis:

1. Obtained Walden IBR approval.

2. Obtained approval to conduct study from TCSG.

3. Received data from TCSG in an electronic Excel file.

4. Screened the data for missing variables.

5. Performed descriptive analysis of the data to familiarize myself with the data

    makeup of the dataset.

Definition and Measurement of Variables

Race was measured by the following question: "What is your race"? The

following choices are listed, and test takers are instructed to select all that are applicable:

Black or African America, Native Hawaiian, Other Pacific Islander, decline to answer,

American Indian or Alaskan Native, None, or White. A total of 1,215 missing values for

the race variable was observed within the raw data set provided from TCSG since some

test takers chose to not provide ethnicity information during the exam application. The

1,215 participants that did not report race represent 6% of the population. The percent of

missing data is negligible and not likely to bias the study outcomes; therefore,

participants who did not report race were not included in the analysis.

Motivation factors for taking the 2014 and 2015 computer-based test were measured by answers to the following question, "What is your main reason for taking the GED test?" Test takers could choose only one of the following: personal gain (e.g., gaining personal satisfaction, serving as a positive example), work related (e.g., getting a new or better paying job, keeping current job) educational gain (e.g., to enter a technical college or a 2 - 4-year degree program), special requirement (e.g., court or corrections requirement, public assistance), or entrance to the military.

Operationalization

The GED exam is a nationally-normed exam that is administered according to strictly controlled guidelines. The 2014 GED test covers Reasoning through Language Arts, Mathematical Reasoning, Social Studies, and Science. Pass or fail exam outcomes were used to answer the research questions. The passing standard on the fifth (2014) GED exam is 145–164 scaled score points in each of the four test areas.

<div align="center">

Data Analyses Plan

</div>

Two chi-square statistical tests were performed to determine significant relationships between a candidate's race and the GED pass or fail outcome, as well as reason for taking the test and GED pass or fail outcome. Logistic regression analysis was used to investigate whether candidate's race and motivation reason can predict a GED pass or fail outcome. The study's dependent variable, pass or fail outcome, was categorical, and the two independent variables, ethnicity, and reason for taking the test, were categorical. The study analysis was conducted using SPSS statistical analysis software. The analyses included the following variables:

The independent variables:

- Candidate's reason for taking the exam: personal gain, work related, educational gain, special requirement or military entrance

- Candidate's race: Black or African American, White, Asian, American Indian or Alaskan Native American, Native Hawaiian or Other Pacific Islander

The dependent variable was the GED exam pass or fail outcome.

Threats to Validity

Validity means whether a measure is valid by determining whether a test measures what is intended to measure without the impact of other factors (Lakshmi, 2013). The researcher evaluated internal and external threats to determine if the study conclusions are accurate, assess whether the independent variable is responsible for the variation in the dependent variable, and determine if the variation might be attributed to other causes. Lakshmi (2013) defined external validity as the degree to which the results of the study are generalizable to other populations outside of the study participants. Internal validity refers to the integrity of the study and the strength of the cause and effect relationship between the independent and dependent variables.

Regarding external validity, the findings of this study were limited to first-time GED candidates who took the computer-based exam in 2014 and 2015 in Georgia. The results of the study may be similar in states with a similar academic profile. Conversely, states with a stronger or weaker academic standing could produce a different outcome. Additionally, the survey questionnaire that assessed motivation may vary by state and

impact study outcome. The paper-based test is available for candidates with special requirements; however, the results of this study may not generalize to paper-based testing. Lastly, the outcome of this study may not be applicable for future test revisions.

In addition to external validity, internal validity factors were considered, and no threats were identified. This study does not take place over time, and thus no history maturation threats were found. This study was not a regression study, and only data from first-time test takers who completed the exam was utilized, and therefore no testing, instrumentation, statistical regression, or experimental mortality threats existed. The study population included all test takers that completed the exam and therefore no selection maturation interaction threats occurred.

Ethical Procedures

Research approval was sought and obtained from Walden IRB before undertaking the study. An application was submitted to the TCSG detailing the study and providing detail on how data would be handled, protected, and approved. In addition, a data release management agreement was signed and provided, along with IRB approval, prior to receiving data from TCSG. The intended purpose of ethical management of research data is to achieve balance between participants' confidentiality and research benefits, utilize anonymization, provide disclosures, and ensure participant consent (Lowrance, 2006). Prior to the TCSG providing the data, each candidate's name was replaced with a pseudonym ID to ensure confidentiality.

All study participants agreed to the GEDTS statement and policy allowing their personal information, including test scores, to be used for research to improve

educational programs, assist them in improving their scores, and plan graduation

ceremonies. Only aggregated genotype data is available to ensure privacy. Individual

data variables were not released prior to IRB approval. Since the data were released, it

has been safeguarded on a personal password protected computer that only the researcher

has access to. The data will be retained for five years. At the end of the 5-year period,

the data will be permanently deleted from the researcher's computer.

Summary

This chapter provided an overview of the methodology of the study including

information on target population, data variables, analysis data, and source of data that

was used in the study. The operationalization of the study variables and the statistical

approaches to testing the study hypotheses were discussed. The chapter concluded with

a synopsis of possible threats to internal and external validity of the study and the ethical

procedures that were executed for this study. Chapter 4 presents descriptive statistics

and the analytical results.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to examine the influence of a candidate's race and reason for taking the test on the outcome of the new computer-based GED exam. An understanding of the target factors that influence success for GED candidates completing the 2014 version of the GED test was gathered through the data collection process of this study. This chapter provides results of data analysis completed on secondary data obtained from the TCSG database. The internal data file contained information on student demographics, motivation factors for completing the exam, and pass or fail outcomes.

The following section presents descriptive statistics of the population and results related to each of the research questions. The following three research questions and hypotheses guided this study:

Q1: Is there a statistically significant relationship between a candidate's race and the GED pass or fail outcome?

Q2: Is there a statistically significant relationship between a candidate's motivation and the GED pass or fail outcome?

Q3: Can a candidate's race and motivation reason predict a GED pass or fail outcome?

Chapter 4 provides the information on the demographics, data collection process, data analysis, and results of statistical analyses, and then summarizes the outcomes of each research question.

Data Analysis

To answer the three research questions, two chi-square analyses were performed to determine statistically significant relationships between a candidate's race and the GED pass or fail outcome and reason for taking the test and GED pass or fail outcome. Binary logistic regression analysis was used to investigate whether candidates' race and motivation reasons can predict a GED pass or fail outcome. The TCSG identified the data for extraction by flagging all students in the GED Georgia state database who had completed the GED exam between January 1, 2014 and December 31, 2015. Following identification of test takers that met the criteria, the TCSG replaced each candidate's name with a pseudo ID. These steps were taken to protect the anonymity of candidates included in the data set. Then, the TCSG organized the extracted data into a Microsoft Excel file. The file contained pseudo ID, ethnicity, reason for testing, and pass or fail outcome for the 2014 and 2015 test years. The TCSG's final step was to send this complete data set, in Microsoft Excel format, to the researcher for further analysis. The summary of the specific information that was captured is displayed in Table 1.

Table 1

Excel File Produced by TCG

Excel File Name	Field names	Field name definitions	Total number of records
Raw Data for IRB 1 K. Middleton	ID	Pseudo ID that replaced candidates name	21,641
	RACE_DESC	Candidates ethnicity	
	REASON_DESC	Candidates motivation reason for taking the exam	
	STATUS_PASS	Pass or fail Outcome	

Descriptive Statistics

Descriptive statistics were performed on the following three variables: ethnicity, reason for taking the exam, and pass or fail outcomes. The analysis was completed to understand better the makeup of the dataset. The frequency and percent information for the race of participants is depicted in Table 2.

Table 2

Frequency and Percent for Race (N=21,641)

	Race	*f*	%
Valid	White	10,590	51.8
	Black or African American	8,805	43.1
	Asian	542	2.7
	American Indian or Alaskan Native	365	1.8
	Native Hawaiian or Other Pacific Islander	124	0.6
Missing	System	1,215	-
Total		21,641	100%

Data from 21,641 participants were included in the study. Just over half of the test takers, 10,590, were White (51.8%), with 8,805 (43.1%) of the test takers reporting their race as Black or African American. 542 identified as Asian (2.7%). There were 365 American Indian or Alaskan Natives (1.8%) and 124 Native Hawaiian or Other Pacific Islanders (.06%). A total of 1,215 participants (0.06%) did not report their race. Participants that did not select a race were excluded from the analyses. The frequency and percent for the motivation reasons are displayed in Table 3.

Table 3

Frequency and Percentage Distribution for the Motivation Reason for Taking the Exam

Motivation reason	f	%
Educational gain	10,354	47.80
Personal gain	5,935	27.40
Work related	3,802	17.60
Special requirement	970	4.50
Entrance to military	580	2.70
Total	21,641	100%

Data on the participants' primary motivation reason for taking the exam were included in the study. Nearly half of the test takers indicated that the exam was taken for educational gain (47.80%). The second highest reason for taking the exam was personal gain (27.4%). Additionally, 3,802 (17.6%) of the test takers indicated that a work related purpose was the motivation for taking the test. Meanwhile, 970 test takers indicated that the test was a special requirement (4.5%), and 580 test takers indicated entrance to the military as their reason (2.7%).

Lastly, the frequency and percentage of participants that passed or failed the GED exam are explained. Of the 21,641 total participants, there were 11,772 (54.4%) who passed the GED exam, while 9,869 (45.6%) failed. Thus, barely more than half of the participants passed the exam while nearly half of the test takers failed the exam.

In addition to descriptive analyses, two chi-square tests of association were performed to determine if there was a statistically significant relationship between the independent and dependent variables. Lastly, binary logistic regression analyses were performed to determine if the independent variables could predict the dependent variable. The following section presents the results for each research question.

Results

Research Question 1

Is there a statistically significant relationship between a candidate's race and the GED pass or fail outcome? To examine Research Question 1, a chi-square test of association was conducted between candidates' race and the GED pass or fail outcome. The chi-square test requires an expected frequency of five per cell at a minimum. All expected cell frequencies were greater than five. The results confirmed that there was a statistically significant association between candidates' race and the GED pass or fail outcome, $\chi2(4) = 1269.714$, $p < 0.05$. The results in Table 4 indicate that there is an association between participants' race and whether they pass or fail the test.

Table 4

*Frequency, Percentage and Post Ad Hoc Analysis for Race and the Exam Pass or Fail Outcome (*N=*21,641)*

	Pass			Fail		
Race	*f*	%	*Adjusted residual*	*f*	%	*Adjusted residual*
White (*N* = 10,560)	7,017	66.3	33.5	3,575	33.7	-33.5
Black or African American (*N* = 8805)	3,597	40.9	-35.4	5,208	59.1	35.4
Asian (*N* = 542)	341	62.9	3.8	201	37.1	-3.8
American Indian or Alaska Native (*N* = 365)	211	57.8	1.1	154	42.2	-1.1
Native Hawaiian or other Pacific Islander (*N* = 124)	70	56.5	.3	54	43.5	-.3
Total (*N* = 20,426)	11,236			9,190		

Note: $\chi^2 = 1269.714$, $df = 4$, $p < .05$.

Statistically significant associations are more likely to occur with large sample sizes; therefore, it is important to examine the effect size to understand if the observed

association is meaningful. For the chi-square test, the two measures of effect size used

were Phi and Cramer's V. Both measure the strength of association of categorical

variables. For this study, the variables were race and pass or failure outcome. Phi is

appropriate when there are two dichotomous variables to analyze, while Cramer's V can

be used in other instances. Therefore, Cramer's V effect size was utilized in this study.

There was a moderately strong association between race and pass or failure outcome

(Cramer's V = .249, $p < 0.05$).

Since the chi-square test was statistically significant, a post hoc analysis was

performed to identify the cells that contributed most to the association. By examining the

adjusted standardized residuals, the cells of interest are those with an adjusted residual

value that exceeds +/- 2 (Sharpe, 2015). The adjusted standardized residuals were

entered into SPSS and their respective chi-square values were calculated by taking the

product of each adjusted residual value (adjusted residual*adjusted residual). To

examine the significance of each chi-square value, the exact p-values for each one of the

chi-square values were also calculated. Furthermore, a Bonferroni Adjusted p-value was

calculated by dividing the initial p-value of 0.05 by the number of analysis which was 10,

hence 0.05/10 = 0.005. The Bonferroni correction is an adjustment made to p-values

when several dependent or independent statistical tests are being performed

simultaneously on a single data set (Napierala, 2012).

Furthermore, 66.3% of Whites, 40.9% of African Americans, and 62.9% of

Asians passed their GED test. The residuals of these three groups were larger than +/-2,

indicating that the differences between these three groups are statistically meaningful.

The six cells associated with p-values greater than +/-2 are listed in Table 4. The negative high-adjusted residual for the number of Black participants who passed their GED test is an indication that statistically significantly fewer Black participants passed than would be expected by chance. Conversely, statistically significantly more White participants passed their GED test than expected by chance, $p < 0.005$. Similarly, significantly more Asians passed their GED test than expected by chance, $p < 0.005$.

Additionally, 57.8% of American Indians and 56.5% of Native Hawaiians passed their GED test. Notably, the observed number of Native Hawaiian or Pacific Islanders and American Indians who passed/failed their GED test was not statistically significantly different than expected, $p > 0.005$. Therefore, being Black, White, or Asian influenced a participant's test outcome and was not due to chance. The pass rate for Blacks is approximately 25% lower than for Whites and Asians. Similarly, the pass rate for Asians (22%), American Indians (16.9%) and Native Hawaiians (15.6%) is higher than African Americans.

Research Question 2

Is there a statistically significant relationship between a candidate's motivation and the GED pass or fail outcome? To examine Research Question 2, a new Chi-square test for association was conducted between candidate's motivation and the GED pass or fail outcome. All expected cell frequencies were greater than five. The results confirmed that there was a statistically significant association between candidate's motivation and the GED pass or fail outcome, $\chi2(4) = 79.412$, $p < 0.05$. The analysis of the results

identified a weak association between motivation reason and pass or failure outcome

Cramer's V= .061, $p <0.05$. These results are shown in Table 5.

Table 5

Frequency, Percentage, and Post Ad Hoc Analysis for Motivation Reason and the Exam Pass or Fail Outcome (N=21,641)

	Pass			Fail		
Reason for taking the exam	*f*	%	*Adjusted residual*	*f*	%	*Adjusted residual*
Educational gain (N=10,354)	5,885	27.2	-6.9	4,721	20.7	6.9
Personal gain (N= 5,935)	3,004	13.9	6.9	2,931	13.5	-6.9
Work related (N=3,802)	1,979	9.1	-3.2	1,823	8.4	3.2
Special requirement (N=970)	580	2.7	3.5	390	1.8	-3.5
Entrance to military (N=580)	324	1.5	.7	256	1.2	-.7
Total (N=21,641)	11,772	54.4		9,869	45.6	

Note: χ^2 =79.412, df = 4, p < .05.

Although the study revealed that there is a statistically significant association, the association is weak. This is possible because the sample size is large enough to influence statistical significance even though the effect size is small. However, the Cramer's V test is independent of the sample size. Hence, the association is statistically significant but not practically relevant.

Since the chi-square test was statistically significant, a post hoc analysis was performed to identify the cells that contributed mostly to the significant association. It was observed that eight cells were associated with *p*-values greater than +/-2 (see Table 5). It was observed that these eight cells were associated with personal gain, educational gain, the special requirement, and work related reasons for taking the exam. Based on the results generated, personal gain had negative adjusted residual in the yes column, which

was significant. This outcome indicated that there were fewer participants that passed the test than expected by chance, $p < 0.005$. Conversely, a statistically significantly greater number of participants who took the test for educational gain passed the test than expected by chance, $p < 0.005$. Additionally, it was observed that for the special requirement, more participants passed the test than expected by chance, $p < 0.005$. For the work related reason, there were fewer participants who passed their test than expected by chance, $p < 0.005$. Hence, personal gain, educational gain, the special requirement, and work related reasons influenced participants' test outcomes and the results were not due to chance.

Research Question 3

Can a candidate's race and motivation reason predict a GED pass or fail outcome? To examine Research Question 3, a binary logistic regression analysis was used to investigate whether candidates' race and motivation reason can predict a GED pass or fail outcome. Peng, Lee, and Ingersoll (2002) recommended logistic regression analysis to predict outcome variables that are dichotomous. The following model was used for the probability of passing GED test:

$$\text{Log } (p/1\text{-}p) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \ldots\ldots\ldots\ldots\ldots + \beta_i x_i$$

Where $X = (X_1, X_2, \ldots\ldots X_i)$ are the set of explanatory variables which are discrete.

To assess the adequacy of the model, the Hosmer and Lemeshow goodness-of-fit test was used to analyze how poor the model is at predicting categorical pass or fail outcomes. A statistically significant result, in this case, would indicate that the model is a poor fit, while a result that is not statistically significant would indicate a good fitting

model. The results of the Hosmer and Lemeshow test were statistically significant (p <

0.05), indicating that the model is a poor fit. This may be a result of the independent

variables having a weak relationship with the dependent variable. Additionally, factors

other than race and motivation may be major contributors to GED test outcome but were

not included in the model. These factors might include the level of preparedness for test,

individual stress level, and gender.

The model summary table contains the Cox & Snell R^2 and Nagelkerke R^2 values

that were used to calculate the percentage of variance explained by the predictors.

Therefore, the explained variation in the dependent variable based on the study model

ranges from 6.5% to 8.7%. Nagelkerke R^2 is a modification of Cox & Snell R^2, the latter

of which cannot achieve a value of 1. For this reason, it is preferable to report the

Nagelkerke R^2 value. Considering this, the researcher concluded that the independent

race and motivation variables account for 8.7% of the variation in test outcome (see

Table 6).

Table 6

Model Summary for the Logistic Regression Model

-2 Log likelihood	Cox & Snell *R* Square	Nagelkerke *R* Square
26732.957[a]	.065	.087

Although the variables under study accounted for a relatively small proportion of

the variation in GED outcome, this result warrants further discussion. Although race and

motivation are statistically significant, they are not the major contributors to GED test

outcome. According to supporting research, additional variables, such as "level of

preparedness", "perceived stress level" and "age" should be taken into consideration to account for a greater variation in GED pass/fail outcome (Neville, Heppner, Ji & Thye, 2004; Achieve, 2005).

This outcome indicates a weak correlation between the independent variables (race and motivation) and test outcome. Furthermore, this reflects the overall poor model fit. A poor fitting model with low R^2 value and statistically significant parameters is an indication that results of the regression analysis are to be interpreted with extreme caution. It can be observed that the results of the chi square analysis are in line with the results of the regression analysis- there is a statistically significant weak relationship between the independent variables and GED pass/fail outcome. However, based on the results of the study, it cannot be concluded that an individual's race and reason for doing the GED test can accurately predict the likelihood of the individual passing or failing the test. Overall, the model is still useful, but a better fitting model would more be more likely to produce a higher R^2 value and hence improve the predictive power of the independent variables.

The analysis of the independent variables in the binary logistic regression are reported in Table 7. The first column in Table 7 consists of the beta values. They are the parameters coefficient and used in the model to predict the probability of an event occurring. The second column consists of the standard errors. The standard errors are used to calculate a confidence interval for each parameter, as shown in the last two columns of the table. The third column consists of the Wald test values, which are used to determine statistical significance for each of the independent variables. The statistical

significance of the test is found in the "Sig." column. The "Exp(B)" column contains the

odds ratio for each independent variable. The values represent the change in odds of each

increase in 1 unit of the independent variable. In the final two columns, the limit

associated with a 95% confidence interval for the Exp(B) statistic are reported.

Table 7 Variables in Equation

Independent Variables							95.0% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Reasons			98.466	4	.000			
Reasons(1) Personal gain	.237	.093	6.465	1	.011	1.268	1.056	1.522
Reasons(2) Educational gain	.023	.092	.063	1	.802	1.023	.855	1.224
Reasons(3) Special requirement	-.135	.114	1.404	1	.236	.874	.699	1.092
Reasons(4) Work related	.355	.096	13.735	1	.000	1.426	1.182	1.721
RACE_DESC			1259.248	4	.000			
RACE_DESC(1) Blacks	.624	.183	11.644	1	.001	1.866	1.304	2.670
RACE_DESC(2) Whites	-.443	.183	5.873	1	.015	.642	.449	.919
RACE_DESC(3) Asians	-.256	.202	1.604	1	.205	.774	.521	1.151
RACE_DESC(4) American Indians	-.068	.210	.105	1	.746	.934	.619	1.411
Constant	-.376	.201	3.492	1	.062	.687		

The analysis established that a candidate's race and motivation are statistically

significant predictors of the likelihood of a GED pass or fail outcome. Having a low R^2

value but statistically significant parameters is an indication that individually the parameters may be good predictors but collectively they aren't good predictors. Specifically, race or motivation still provides information about GED fail/pass outcome. To improve the R^2 value additional relevant independent variables are needed in the model. The results show that reason for taking the test has an overall statistically significant effect on the participant's pass or fail outcome on the test (Wald=98.466, df=4, $p < .000$). Specifically, the odds of passing the GED test, for participants who take the test for personal gain is 26.8% higher than those who take the exam for entrance to the military. Furthermore, participants who take the test for educational gain have 2.3% higher odds of passing the test when compared to participants who take the exam for entrance to the military. However, participants who took the test due to a special requirement were statistically significantly less likely to pass the GED test when compared to those who took the test for entrance to the military (12.6% lower odds). Individuals who took the test because of work related reasons have a 42.6% higher odd of passing the test than participants who take the test to enter the military.

The results show that the candidate's race has an overall statistically significant effect on whether the participant's pass or fail outcome on the test (Wald=1259.248, df=4, $p < .000$). The results indicate that Black participants who took the GED test have an 86.6% higher odd of passing the test when compared to Native Hawaiian or Other Pacific Islander. White participants had a statistically significantly lower odd of passing their test when compared to Native Hawaiian or Other Pacific Islanders (35.8% lower odds).

Summary

As previously stated, the primary goal of this study was to determine factors that influence the pass or fail outcome on the GED exam. Identifying these factors could lead to further understanding of the reasons for a decline in the GED participation and pass rates with the release the first computer-based GED test (5th edition). This research study focused on the significance of candidate's race and reason for taking the exam on the pass or fail outcome. In summary, the research study's data findings point to the fact there is a statistically significant relationship between a candidate's race and reason for taking the exam, and the pass or fail outcome. Furthermore, the analysis established that a candidate's race and motivation are statistically significant predictors of the likelihood of a GED pass or fail outcome.

Additionally, the data revealed the pass rate for Blacks is approximately 25% lower than for Whites and Asians. Correspondingly, the pass rate for Asians (22%), American Indians (16.9%) and Native Hawaiians (15.6%) is higher than African Americans. Lastly, the data revealed that the odds of passing the GED test, for participants who take the test for work related reasons are 42.6% higher than those who take the exam for entrance to the military. However, participants who took the test due to a special requirement were significantly less likely to pass the GED test when compared to those who took the test for entrance to the military (12.6% lower odds). Chapter 5 includes an interpretation of the findings and provide a concluding summary.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The primary purpose of this study was to determine if there is a statistically significant relationship between the pass or fail GED outcome and a candidate's race and motivation for taking the GED exam. In addition, analysis was performed to determine whether a candidate's race and motivation could predict a GED pass or fail outcome. This study contains information that could be helpful to GED educators and students for better understanding factors that can influence student success and the learners' and educators' needs.

This study focused on Georgia test takers who completed the GED exam during the 2014 and 2015 test years. Secondary data were constructed from survey responses in which test takers provided information about their races and motivations for taking the exam. In addition, the TCSG recorded and made the test takers' pass or fail outcomes available for analysis.

Research Questions and Conclusions

Three research questions guided the study. The results and conclusions of each question are discussed below.

Research Question 1

The first research question sought to test whether there is a statistically significant relationship between candidates' race and the GED pass or fail outcome, and the results confirmed that there is a statistically significant association: $\chi2(4) = 1269.714$, $p < 0.05$. Since statistically significant associations are more likely to occur with large sample

sizes, the effect size was examined to determine if the association observed is meaningful. The results indicated a moderately strong association between race and pass or failure outcome: Cramer's V = .249, $p < 0.05$. Based on the test results, the null hypothesis was rejected; there is a statistically significant relationship between the GED pass or fail outcome and the candidate's race.

Research Question 2

The second research question sought to test whether there is a statistically significant relationship between a candidate's motivation for taking the exam and the GED pass or fail outcome. The results confirmed that there is a statistically significant association between a candidate's motivation and the GED pass or fail outcome: $\chi^2(4) = 79.412$, $p < 0.05$. The results indicated a weak association between motivation and pass or failure outcome: Cramer's V = .061, $p < 0.05$. Based on the test results, the null hypothesis was rejected; there is a statistically significant relationship between the GED pass or fail outcome and a candidate's motivation for taking the exam. Lakens (2013) asserted that statistical influence depends on the sample size of the study, the size of the effect, and the significance criterion. Although the results were statistically significant, the correlation was weak, suggesting that the statistical significance is more likely due to the large sample size rather than a meaningful correlation. The low correlation may be due to a weak measurement. In this study, a one-item scale was used to measure motivation, and it could be that the concept of motivation to take the exam is a more complex construct than a single-item scale could measure.

Research Question 3

The third research question sought to test whether a candidate's race and motivation for taking the exam predicted a GED pass or fail outcome. The binary logistic regression analysis established that a candidate's race and motivation are statistically significant predictors of the likelihood of a GED pass or fail outcome; however, they are not the major contributors to GED test outcome. The results show that the participant's reason for taking the test has an overall statistically significant effect on his or her pass or fail outcome (Wald = 98.466, $df = 4$, $p < .000$). There is a statistically significant weak relationship between the independent variables and GED pass or fail outcome. The statistically significant results are likely an artifact of the large sample size. The poor model fit and weak R^2 indicated the results of the binary logistic regression are not practically interpretable. The analysis was consistent in establishing that the reason for taking the test is statistically significant; in the chi-square test, the results were statistically significant but the effect size was weak.

<div align="center">

Interpretation of the Findings

</div>

The goal of this study was to evaluate the influence of a candidate's race and reason for taking the exam on pass or fail outcomes of the new computer-based GED exam. Understanding the influence of a candidate's race and reason for taking the exam on the pass or fail outcomes of the new computer-based GED exam may reveal factors that could help GED organizations improve the CBT pass rate. The findings of this research were not able to definitively establish that candidates' races and motivations for taking the GED influence GED pass or fail outcomes.

Overall, 66.3% of Whites passed, 40.9% of African Americans passed, and 62.9% of Asians passed their GED tests. Additionally, 57.8% of American Indians and 56.5% of Native Hawaiians passed. Notably, the observed number of Native Hawaiian or Pacific Islanders and American Indians who passed or failed their GED tests was not statistically significantly different than the expected amount, $p > 0.005$. These findings did reveal a statistically significant relationship between pass or fail outcomes for all ethnicities except Native Hawaiian or Pacific Islanders and American Indians. These findings were not a surprise, as several researchers (see Arcidiacono & Koedel, 2014; Burgess & Greaves, 2013; Próspero, Russell, & Vohra-Gupta, 2012) have focused on the ways in which cultural and racial ethnicities affect academic performance. Those researchers found that school quality, including the level of access to technology and qualified teachers, contribute to student achievement disparity between minorities and their White counterparts.

Significantly, the pass rate for Blacks is approximately 25% lower than that of Whites and Asians. Arcidiacono and Koedel (2014) also found a disparity in education success amongst African Americans, reporting that 6-year college graduation rates for African Americans are over 20 percentage points lower than those of Whites. Additional researchers have noted disparities in performance between African Americans and Whites (Burgess & Greaves, 2013; Próspero, Russell, & Vohra-Gupta, 2012). Arcidiacono and Koedel (2014) posited that the disparity between African American graduation rates and Whites can be attributed to high school quality, school selections, and pre entry skills. Pre-entry skills include technology readiness and other 21st century

competences. Altering African-American school selections to align with quality-comparable selections of White students can reduce racial differences in performance (Arcidiacono & Koedel, 2014). Bohrnstedt et al. (2015) conducted similar research, but focused on the impact of school composition on the Black and White achievement gap. Keels (2013) argued that it is important to explore other success factors beyond prior academic preparation to understand the reasons that contribute to racial or ethnic gaps in education.

The findings of this study support existing research that there are multiple factors that contribute to student performance. The study results did not establish that an individual's race or reason for taking the GED exam can accurately predict the likelihood of a pass or fail outcome. Overall, the regression model used to predict GED outcome was useful to some extent, as it reinforced the chi-square test in establishing that the reason for taking the test is statistically significant. The model was a poor fit because only one item was used to measure motivation. A better-fitting model would be more likely to produce a higher R^2 value and thereby improve the predictive power of the independent variables. As student achievement is multidimensional, additional variables, such as level of preparedness, perceived stress level, and age should be taken into consideration in future research to account for more of the variations in GED pass or fail outcomes. Adding additional variables would introduce a completely different model. Again, one of the major constraints of using secondary data is the reliance solely on secondary data, where certain variables were not available.

The theoretical framework for this study is based on the theory of expectancy. The modified expectancy theory regards an action as a means of obtaining a reward (Tien, 2000). This theory posits that if a person does not value the long-term reward, he or she will not work hard—in this case, to pass the GED exam (Beck, 2003). Since the chi-square test showed there was a statistically significant relationship between a candidate's motivation and the GED pass or fail outcome, a post hoc analysis was performed to identify the cells that contributed mostly to the significant association. The chi-square study results show personal gain, educational gain, special requirement, and work related reasons influenced participants test outcome and the results were not due to chance.

The results show that the motivation reason for taking the test has an overall statistically significant effect on the participant's pass or fail outcome (Wald = 98.466, df = 4, $p < .000$). The GEDTS should consider educating GED test takers on the possible rewards of obtaining a GED. Nearly half of the test takers (47.8%) indicated that they took the exam for educational gain; only 17.6% of the test takers indicated that a work related purpose was their motivation for taking the test. Both the results and expectancy theory supports the idea that students' perceptions of the level of rewards affects their motivations and outcomes. Considering the high odds of passing associated with participants that took the exam for work related purposes, GED administrators should spend additional time educating students on the work related rewards of passing the exam.

Limitations of the Study

The primary limitations of this study relate to the instrumentation and secondary data analyses. The instrumentation is limited by the singular analysis of only the GED candidate's motivation for taking the exam; there are likely other factors that contribute to a test taker's motivation for taking the exam beyond the noted reason. The analysis revealed that the independent race and motivation variables account for 8.7% of the variation in test outcome, indicating that the model is a poor fit. A model with a better fit would be more likely to produce a higher R^2 value, which in turn might provide evidence of the predictability of the independent variables effects.

An additional limitation pertains to the participant pool being limited to Georgia. Including additional states could produce a different racial and academic makeup, and variance in the factors that influence pass or fail outcomes. Common Core state standards have attempted to standardize K–12 schools across the country to prepare students for college (Rotham, 2012), but despite these efforts, high schools continue to vary regarding curriculum, technology, textbooks, and teacher credentials. Borhnstedt et al. (2015) indicated that 26 states and the District of Columbia were planning to administer some form of computer-based state exam in 2008–2009. This research further demonstrates the inconstancy of curriculum and technology among states and school systems.

Implications

This study was designed to explore the possible relationship between a candidate's race and reason for taking the GED exam and his or her pass or fail test

outcome, to enable GED organizations to consider suggestions for improving test preparation and increasing the number of test takers who pass. The study found a statistically significant relationship between pass or fail outcomes for all ethnicities except Native Hawaiian or Pacific Islanders and American Indians. These findings were not a surprise, as several researchers (see Arcidiacono & Koedel, 2014; Burgess & Greaves, 2013; Próspero, Russell, & Vohra-Gupta, 2012) have focused on the ways in which cultural and racial ethnicities affect academic performance. Those researchers found that school quality, including the level of access to technology and qualified teachers, contribute to student achievement disparity between minorities and their White counterparts. In addition, the results suggest that different motivational factors resulted in higher performance.

This research affects social change by adding to the understanding of racial and motivation factors that influence GED pass or fail outcomes. It also presents a data set that shows a group with high odds of passing the exam for participants that took the exam for work related purposes. Considering only 17.6% of the test takers indicated that a work related purpose was their motivation for taking the test, it is recommended that GED administrators spend additional time educating students on the work related rewards of passing the exam. GED administrators, teachers, and students can combine their efforts and use the findings of this study to improve outcomes on the new computer-based GED exam. Social change implications are that more examinees will be able to pass the GED exam, attend college, and gain improved employment if they are properly motivated to achieve success.

For example, GED preparatory systems, educators, and administrators could implement a formal orientation session to educate GED students on the various work related, personal and educational rewards of passing the exam. In addition, implementing remedial computer-based technology classes as part of the GED preparation process for educators and students may help to close technology education gaps and support GED success. The study found that different motivational factors resulted in higher performance. During orientation sessions, administrators can emphasize the work related benefits of passing the GED exam if they are unware. This insight could improve a candidate's awareness of these reward and in turn improve their motivation and probability of achieving a pass outcome on the exam. The additional orientation and training could improve preparedness of both students and educators and subsequently promote positive social change by improving the test outcome.

Students' ethnicity and access to computer-based education has a relationship with the pass or fail outcome of the exam. On the new computer-based exam, the pass rate for Blacks is approximately 25% lower than that of Whites and Asians. This disparity in the pass rate can be attributed to multiple factors, including technology access, technology readiness, and acute stress. Neville, Heppner, Ji, and Thye (2004) posited that minority students can feel social isolation and stress, and feel more negatively about their environment. Arcidiacono and Koedel (2014) found a disparity in education success amongst African Americans, reporting that 6-year college graduation rates for African Americans are over 20 percentage points lower than those of Whites. Additional researchers have noted disparities in performance between African Americans

and Whites (Burgess & Greaves, 2013; Próspero, Russell, & Vohra-Gupta, 2012). An

instructor's awareness of an individual's computer skills and motivation may help the

instructor increase the test taker's competence and determine effective means of

improving the test taker's likelihood of passing the exam. This individual involvement

and increased engagement will be particularly helpful to at-risk minority students or those

without family support.

　　　　Students' perception of the benefits of passing the GED is a strong contributor to

their perception of their likelihood of succeeding on the exam. As discussed in Chapter

2, the modified expectancy theory posits that if a person does not value the long-term

reward, he or she will not work hard, in this case, to pass the GED exam (Beck, 2003).

Nearly half of the test takers (47.8%) indicated that they took the exam for educational

gain. However, the odds of passing the test for individuals who took the test because of

work related reasons were 42% higher than those of participants who took the test to

enter the military, while the participants who took the test for educational gain had only

2.3% higher odds of passing the test when compared to participants who took the exam

for entrance to the military. Helping students to understand the work related benefits of

passing the GED exam could improve their awareness of this reward and in turn improve

their pass rate. In addition, implementing remedial computer-based technology classes as

part of the GED preparation process for educators and students may help to close

technology education gaps and support GED success.

　　　　These improvements could lead to an increased number of pass outcomes on the

exam and subsequently improve the lifestyles of GED test takers. GED graduates can

demonstrate 21st century job skills, increasing their marketability and earning potential.

In 2013, the average earnings of high school graduates ages 25 to 64 were $30,000,

compared to $23,900 for high school dropouts and $48,500 for college graduates (NCES,

2013). Additionally, high school dropouts are more likely to be out of the job market

(42%) and unemployed (8%), compared to high school graduates (26% and 6%,

respectively) (Murnane, 2013). This effect has a residual impact on GED graduates and

their families. The current study is aimed at identifying influences that contribute to

student success on the new computer based exam. The positive residual impacts of more

students passing the GED exam include: higher wages, better job opportunities and being

better positioned to support their children in obtaining academic success.

Recommendations

The identified limitations provide opportunities for further research. The line of

questioning for GED test takers should be expanded to include perceptions of level of

preparedness for test, individual stress levels, and gender. The participation pool should

also be expanded to include other states, as limitations were associated with utilizing

secondary data only from GED test takers in Georgia. Arcidiacono and Koedel (2014)

conducted a study to examine the factors that might contribute to the disproportionate

achievement gap of African Americans in secondary education and found that a high

quality of education impacted completion scores. Each state has variations in quality of

schools, technology exposure, and curriculum, so expanding the participant pool to other

states would normalize the study outcomes. Future studies should include additional

states and regions to provide a wider spectrum of the factors that influence the GED

exam outcome.

Based on the findings of this study, GED organizations, practitioners, and

administrators should focus more of their attention on understanding the motivational and

ethnicity influences that may improve GED performance. Get to know your students.

GED organizations should also incorporate career development orientations into the GED

process to best educate students and help them align their goals to achieve maximum

rewards from earning their GED credentials. This focus will result in positive social

change by allowing educators to better equip *all* GED test takers with the appropriate

preparation resources and awareness of future opportunities to motivate GED success.

Conclusion

This chapter discussed the results of the study, its limitations and implications,

and recommendations for practitioners and researchers. This research study utilized

secondary data to examine the influence of a candidate's race and reason for taking the

test on the outcomes of the new computer-based GED exam. The Technical College

System of Georgia provided secondary data, including unidentifiable data for students

who had completed the GED exam between January 1, 2014, and December 31, 2015.

The expected outcome was an increase in awareness of the factors that influence a pass or

fail GED outcome to help to improve the number of people who pass the exam.

A chi-square analysis revealed there is a statistically significant association

between a candidate's race and the GED pass or fail outcome. A second chi-square

analysis identified that there is a statistically significant association between a candidate's

motivation for taking the exam and the GED pass or fail outcome; however, this association is weak. Finally, based on the results of the logistic regression analysis, there is some tentative evidence that a candidate's race and motivation are statistically significant predictors of the likelihood of a GED pass or fail outcome. However, a weak correlation was found between the independent variables (race and motivation) and test outcome, indicating an overall poor model. The insufficiency of the model can be attributed to a single item being used to measure motivation for taking the test. This weakness is the result of utilizing secondary data in which students' motivations for taking the exam were identified from their answers to one question on a previously completed survey. The research suggests that a replication of the study be performed with more robust measures to provide better evidence that the independent variables (a candidate's race and motivation) predict a GED pass or fail outcome. Additional variables, such as level of preparedness, perceived stress level, and age should be taken into consideration in future research to account for the variations in GED pass or fail outcomes.

References

Achieve, Inc. (2010). *On the road to implementation: Achieving the promise of the common core state standards*. Retrieved from http://www.achieve.org./files/FINAL-CCSSImplementationGuide.pdf

Achieve, Inc. (2005). *Rising to the challenge: Are high school graduates prepared for college and work?* Washington, DC: Achieve, Inc. Retrieved from http://www.achieve.org/files/pollreport_0.pdf

American Diploma Project. (2004). *Ready or not: Creating a high school diploma that counts*. Washington, DC: Achieve, Inc. Retrieved from http://www.achieve.org/files/ReadyorNot.pdf

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.

Arcidiacono, P., & Koedel, C. (2014). Race and college success: Evidence from Missouri. *American Economic Journal: Applied Economics, 6*(3), 20-57. http://dx.doi.org/10.1257/app.6.3.20

Au, W. (2013). Hiding behind high-stakes testing: Meritocracy, objectivity and inequality in US education. *International Education Journal: Comparative Perspectives*, *12*(2), 7-20.

Auchter, J. (1998). The value of the GED tests. *NCAL Connections*, *1*, 4.

Aud, S., Hussar, W., Planty, M., Snyder, T., Bianco, K., Fox, M. A., & Drake, L. (2010). *The condition of education 2010: NCES 2010-028*. National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubs2010/2010028.pdf

Barton, P. E. (2005). *One-third of a nation: Rising dropout rates and declining opportunities.* Retrieved from http://files.eric.ed.gov/fulltext/ED485192.pdf

Batchelder, J. S., Flynn, M., Moseley, W. T., & Pippin, M. (2015). Considerations Surrounding the effects of race, age, and gender on GED success among jail inmates. *International Journal of Social Science Studies*, *3*(5), 69-75.

Beck, R. C. (2003). *Motivation: Theories and principles, 4/e*. Engelwood Cliffs, N.J: Prentice-Hall.

Belzer, A. (2005). Improving professional development systems: Recommendations from the Pennsylvania adult basic and literacy education professional development system evaluation. *Adult Basic Education*, *15*(1), 33-35.

Bennett, R. E. (2006). Inexorable and inevitable: The continuing story of technology and assessment. *Computer-Based Testing and the Internet: Issues and Advances*, *1*(1), 201–217.

Bergman, A., Kong, G., & Pope, A. (2014). General Education Development (GED®) credential attainment, externalizing disorders, and substance use disorders in disconnected emerging adults. *Journal of Research & Practice for Adult Literacy, Secondary & Basic Education*, *3*(2), 8–20.

Bingham, M. J. (2002). *Are the GED tests a high school equivalency or a high school alternative?* Retrieved from http://files.eric.ed.gov/fulltext/ED465080.pdf

Birenbaum, M. (1996). Assessment 2000: Towards a pluralistic approach to assessment. In *Alternatives in assessment of achievements, learning processes and prior knowledge* (pp. 3-29). Springer, Netherlands: Kluwer Academic Publishers.

Bohrnstedt, G., Kitmitto, S., Ogut, B., Sherman, D., & Chan, D. (2015). *School Composition and the Black–White Achievement Gap: Methodology Companion*. Retrieved from https://nces.ed.gov/nationsreportcard/subject/studies/pdf/school_composition_and_the_bw_achievement_gap_2015_methodology.pdf

Brinkley-Etzkorn, K. E., & Skolits, G. (2014). Anticipated effects of the GED® Test on educators and young adult learners. *Journal of Research and Practice for Adult Literacy, Secondary, and Basic Education*, *3*(3), 8-21.

Brown, S., Race, P., & Bull, J. (1999). *Computer-assisted assessment in higher education.* Herndon, VA: Stylus Publishers Inc.

Burgess, S., & Greaves, E. (2013). Test scores, subjective assessment, and stereotyping of ethnic minorities. *Journal of Labor Economics*, *31*(3), 535-576.

Burke, M. (2010). Overcoming challenges of the technological age by teaching information literacy skills. *Community and Junior College Libraries*, *16*(4), 247–254.

Card, D., & DiNardo, J. E. (2002). *Skill biased technological change and rising wage inequality: Some problems and puzzles* (No. w8769). Chicago, IL: National

Bureau of Economic Research.

Carnevale, A. P., Smith, N., & Strohl, J. (2010). *Help wanted: Projections of job and education requirements through 2018*. Washington, DC: Georgetown University Center on Education and the Workforce.

Church, R. M. (2002). The effective use of secondary data. *Learning and Motivation*, *33*(1), 32-45.

Cinar, O., Bektaş, Ç., & Aslan, I. (2011). A motivation study on the effectiveness of intrinsic and extrinsic factors. *Economics and Management*, *16*, 690-695. Retrieved from http://www.academia.edu/10405872/A_MOTIVATION_STUDY_ON_THE_EFF ECTIVENESS_OF_INTRINSIC_AND_EXTRINSIC_FACTORS

Clark, D., & Martorell, P. (2014). The signaling value of a high school diploma. *Journal of Political Economy*, *122*(2), 282–318.

Conley, D. T. (2007). *Redefining college readiness. Educational Policy Improvement Center (NJ1)*. Retrieved from ERIC database. (ED539251)

Creswell, J. W., Hanson, W. E., Plano, V. L. C., & Morales, A. (2007). Qualitative research designs selection and implementation. *The Counseling Psychologist*, *35*(2), 236–264.

Czaja, S. J., Charness, N., Fisk, A. D., Hertzog, C., Nair, S. N., Rogers, W. A., & Sharit, J. (2006). Factors predicting the use of technology: Findings from the Center for Research and Education on Aging and Technology Enhancement (CREATE). *Psychology and Aging*, *21*(2), 333.

Darling-Hammond, L., & Adamson, F. (2010). *Beyond basic skills: The role of performance assessment in achieving 21st century standards of learning*. Retrieved from https://scale.stanford.edu/system/files/beyond-basic-skills-role-performance-assessment-achieving-21st-century-standards-learning.pdf

Deighton, J., & Quelch, J. (2009). *Economic value of the advertising-supported internet ecosystem.* Retrieved from https://www.iab.com/wp-content/uploads/2017/03/Economic-Value-Study-2017-FINAL2.pdf

DePaoli, J. L., Fox, J. H., Ingram, E. S., Maushard, M., Bridgeland, J. M., & Balfanz, R. (2015). *Building a Grad Nation: Progress and Challenge in Ending the High School Dropout Epidemic. Annual Update 2015*. Retrieved from ERIC database. (ED556759)

Economides, A. A. (2006). Adaptive feedback characteristics in cat. *International Journal of Instructional Technology and Distance Learning*, *3*(8), 15-54.

Economides, A. A. (2009). Conative feedback in computer-based assessment. *Computers in the Schools*, *26*(3), 207-223.

Ezzelle, C., & Setzer, J. C. (2009). *Technical manual: 2002 series GED tests*. Retrieved from ERIC database. (ED510126)

Fisk, A. D., Rogers, W. A., Charness, N., Czaja, S. J., & Sharit, J. (2009). *Designing for*

older adults: Principles and creative human factors approaches. New York, NY: CRC Press.

Galbraith, J., & Cummings, L. L. (1967). An empirical investigation of the motivational determinants of task performance: Interactive effects between instrumentality—valence and motivation—ability. *Organizational Behavior and Human Performance*, *2*(3), 237–257.

GED Testing Service. (2009) *GED Testing Fact Sheet.* Retrieved from ERIC database. (ED510082)

GED Testing Service. (2012). *Assessment Guide for Educators, Image Screen Capture.* Retrieved from http://www.state.nj.us/education/students/adulted/ae/AssessmentGuide1.pdf

GED Testing Service. (2013). *2013 annual statistical report on the GED test*. Retrieved from http://www.gedtestingservice.com/educators/historical-testing-data

GED Testing Service. (2014). *GED test a content comparison*. Retrieved from http://www.gedtestingservice.com/uploads/files/e4b463eb7a4fc68024098c42f851 dd6a.pdf

GED Testing Service. (2014a). *The 2014 GED® program.* Retrieved from http://www.gedtestingservice.com/uploads/files/5072dad32a4de1bf643880a fba1a0ec4.pdf

GED Testing Service. (2014b). *Technical Manual 2014 GED Test*. Retrieved from http://www.gedtestingservice.com/uploads/files/01388a9ec8b540a6aa257f8727bc 8830.pdf

GED Testing Service. (2015a). *A fighting chance at 4 million jobs*. Retrieved from

http://www.gedtestingservice.com/2015-test-for-education

GED Testing Service. (2015b). *GED Testing Service computer-based testing usability

study*. Retrieved from

http://www.gedtestingservice.com/uploads/files/c3a2d3d5add2727066df6cfc99df

ecb4.pdf

Gehring, J. (2002). The GED: New tests, new challenges. *Education Week*, *21*(19), 1.

George-Ezzelle, C. E., & Hsu, Y. C. (2006). GED [R] candidate computer familiarity

survey. GED Testing Service research studies, 2006-2. *GED Testing Service*.

Retrieved from http://files.eric.ed.gov/fulltext/ED510084.pdf

Ginsburg, L., Sabatini, J., & Wagner, D. A. (2010). Basic skills in adult education and the

digital divide. *Learning to bridge the digital divide*, 77-89. Retrieved from

http://www.oecd.org/site/schoolingfortomorrowknowledgebase/themes/ict/41284

692.pdf

Gomez, E. A., Wu, D., & Passerini, K. (2010). Computer-supported team-based learning:

The impact of motivation, enjoyment and team contributions on learning

outcomes. *Computers & Education*, *55*(1), 378–390.

Greene, J. P., & Forster, G. (2003). *Public high school graduation and college readiness

rates in the United States. Education working paper no. 3*. Retrieved from ERIC

database. (ED498138)

Hanlon, T. (2016, April 8). What's next after Alaska cancels its federally mandated

standardized test. *Alaska Dispatch News*. Retrieved from

http://www.adn.com/article/20160408/what-s-next-after-alaska-cancels-its-federally-mandated-standardized-test

Heckman, J. J., Humphries, J. E., LaFontaine, P. A., & Rodriguez, P. L. (2012). Taking the easy way out: How the GED testing program induces students to drop out. *Journal of labor economics*, *30*(3), 495-520.

Heckman, J. J., Humphries, J. E., & Mader, N. S. (2010). The GED. Retrieved from https://www.econstor.eu/bitstream/10419/36948/1/627395287.pdf

Heckman, J. J., & LaFontaine, P. A. (2010). The American high school graduation rate: Trends and levels. *The Review of Economics and Statistics*, *92*(2), 244–262.

Hemphill, F. C., & Vanneman, A. (2011). *Achievement gaps: How Hispanic and White students in public schools perform in mathematics and reading on the National Assessment of Educational Progress*. Statistical analysis report. NCES 2011-459. National Center for Education Statistics. Retrieved from http://files.eric.ed.gov/fulltext/ED520960.pdf

Higgins, J., Patterson, M. B., Bozman, M., & Katz, M. (2010). Examining the feasibility and effect of transitioning GED tests to computer. *The Journal of Technology, Learning and Assessment*, *10*(2). Retrieved from https://ejournals.bc.edu/ojs/index.php/jtla/article/viewFile/1602/1456

Hoffman, A. M., Wine, M. P., & McKinney, J. S. (2013). A GED test for a Common Core world: Understanding the changes coming in 2014. Retrieved from https://www.gedtestingservice.com/uploads/files/6c97b538e2780491ee60d1d297d5d9f5.pdf

Jobs Council Recommendations. (2015) *Prepare the American Workforce to Compete in the Global Economy*. Retrieved from http://files.jobs-council.com/files/2012/01/JC_FactSheet_Education.pdf

Joosten-ten Brinke, D., Van Bruggen, J., Hermans, H., Burgers, J., Giesbers, B., Koper, R., & Latour, I. (2007). Modeling assessment for re-use of traditional and new types of assessment. *Computers in Human Behavior*, *23*(6), 2721–2741.

Keels, M. (2013). Getting them enrolled is only half the battle: College success as a function of race or ethnicity, gender, and class. *American Journal of Orthopsychiatry*, *83*(2-3), 310-322. doi:10.1111/ajop.12033

Kiener, R. (2014). Dropout rate: Are new policies needed to keep more teens in school? *CQ Researcher*, *22*(24). Retrieved from http://library.cqpress.com/cqresearcher/document.php?id=cqresrre2014061300

Kuzmina, I. P. (2010). Computer-based testing: advantages and disadvantages. *Вісник Національного технічного університету України*, (1), 192-196.

Lukens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Frontiers in psychology*, *4*, 863. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3840331/

Lakshmi, S., & Mohideen, M. A. (2013). Issues In Reliability and Validity of Research. *International Journal of Management Research and Reviews*, *3*(4), 2752.

Lee, C. C., Czaja, S. J., & Sharit, J. (2009). Training older workers for technology-based employment. *Educational Gerontology*, *35*(1), 15–31.

Lipke, T., & Farrell, M. (2014). GED Test and Its Impact on Adult Literacy Providers. *ProLiteracy White Paper*. Retrieved from http://paacesite.org/images/downloads/proliteracy_ged_white_paper_1_.pdf

Lowrance, W. W. (2006, October). Privacy, Confidentiality, and Identifiability in Genomic Research. In *TERRA INCOGNITA. 29th International Conference of Data Protection and Privacy Commissioners*. Retrieved from https://www.genome.gov/pages/about/od/reportspublications/identifiabilityworkshopwhitepaper.pdf

Martins, L. L., & Kellermanns, F. W. (2004). A model of business school students' acceptance of a web-based course management system. *Academy of Management Learning & Education*, *3*(1), 7–26.

McNeil, M. (2011, April 22). Duncan issues far more NCLB waivers than predecessor. Education Week. Retreived from https://www.edweek.org/web/articles/2011/04/22/29nclb_ep.h30.html

Mead, S. E., Sit, R. A., Rogers, W. A., Jamieson, B. A., & Rousseau, G. K. (2000). Influences of general computer experience and age on library database search performance. *Behaviour & Information Technology*, *19*(2), 107–123.

Miller, A. D. (2014). *To Bridge the Skills Gap, Focus on Improving Computer Science's Image*. Retrieved from http://techcrunch.com/2014/09/24/to-bridge-the-skills-gap-focus-on-improving-computer-sciences-image

Mitchell, T. R. (1974). Expectancy models of job satisfaction, occupational preference and effort: A theoretical, methodological, and empirical appraisal. *Psychological*

Bulletin, *81*(12), 1053.

Moore, R. T., & Davies, J. A. (1984). Predicting GED scores on the bases of expectancy, valence, intelligence, and pretest skill levels with the disadvantaged. *Educational and psychological measurement*, *44*(2), 483-490.

Moridis, C. N., & Economides, A. A. (2009). Mood recognition during online self-assessment tests. *Learning Technologies, IEEE Transactions on*, *2*(1), 50-61.

Mulhere, K. (2015, January 20). GED drop. *Inside Higher Ed.* Retrieved from https://www.insidehighered.com/news/2015/01/20/ged-numbers-down-amid-time-transition-high-school-equivalency-exams

Murnane, R. J. (2013). *US high school graduation rates: Patterns and explanations* (No. w18701). National Bureau of Economic Research. Retrieved from https://assets.documentcloud.org/documents/760625/murnane-paper-on-grad-rates.pdf

Napierala, M. A. (2012). What is the Bonferroni correction. *AAOS Now*, *6*(4), 40.

National Assessment of Educational Progress. (n.d.). In *Wikipedia*. Retrieved April, 8, 2016, from https://en.wikipedia.org/wiki/National_Assessment_of_Educational_Progress

National Educational Technology Plan Technical Working Group. (2010). *Transforming American education: Learning powered by technology.* Retrieved from http://www.ed.gov/sites/default/files/netp2010.pdf

Negroponte, N. (1995). Being Digital. New York, NY: Vintage Books.

Neville, H. A., Heppner, P. P., Ji, P., & Thye, R. (2004). The relations among general and race-related stressors and psychoeducational adjustment in Black students attending predominantly White institutions. *Journal of Black Studies*, *34*(4), 599-618.

Ngai, E. W., Poon, J. K. L., & Chan, Y. H. C. (2007). Empirical examination of the adoption of WebCT using TAM. *Computers & Education*, *48*(2), 250–267.

Noguera, P. A. (2012). Saving black and Latino boys. *Education Week*, 693-703.

Próspero, M., Russell, A. C., & Vohra-Gupta, S. (2012). Effects of motivation on educational attainment: Ethnic and developmental differences among first-generation students. *Journal of Hispanic Higher Education*, 1538192711435556.

Ricketts, C., & Wilks, S. J. (2002). Improving student performance through computer-based assessment: Insights from recent research. *Assessment & Evaluation in Higher Education*, *27*(5), 475–479. doi:10.1080/0260293022000009348

Rothman, R. (2012). A common core of readiness. *Educational Leadership*, *69*(7), 10–15.

Ryder, A. J., & Hagedorn, L. S. (2012). GED and other noncredit courses: The other side of the community college. *New Directions for Institutional Research*, *2012*(153), 21–31.

Sanchez, R. J., Truxillo, D. M., & Bauer, T. N. (2000). Development and examination of an expectancy-based measure of test-taking motivation. *Journal of Applied Psychology*, *85*(5), 739.

Sarantakos, S. (2012). *Social research*. New York, NY: Palgrave Macmillan.

Schmitt, N., & Son, L. (1981). An evaluation of valence models of motivation to pursue various post high school alternatives. *Organizational Behavior and Human Performance*, *27*(1), 135–150.

Sharpe, C., & Reddy, J. (2014). *Pass key to the GED test.* Hauppauge, New York: Barron's Educational Series.

Sharpe, D. (2015). Your chi-square test is statistically significant: Now what? *Practical Assessment, Research & Evaluation*, *20*(8). Retrieved from http://www.pareonline.net/getvn.asp?v=20&n=8

Silva, E. (2008). Measuring skills for the 21st century. *Education Sector.* Retrieved from http://dc2.bernan.com/KCDLDocs/KCDL29/CI%20K~%20389.pdf

Sireci, S. G., & Zenisky, A. L. (2006). Innovative item formats in computer-based testing: In pursuit of improved construct representation. *Handbook of Test Development*, 329–347. Mahwah, NJ: Lawrence Erlbaum Assoicates Publishers.

Soulé, H., & Warrick, T. (2015). Defining 21st century readiness for all students: What we know and how to get there. *Psychology of Aesthetics, Creativity, and the Arts*, *9*(2), 178.

Stillwell, R., & Sable, J. (2013). Public School Graduates and Dropouts from the Common Core of Data: School Year 2009-10. First Look (Provisional Data). NCES 2013-309rev. Retrieved from ERIC database. (ED566134)

Sutantoputri, N. W., & Watt, H. M. (2012). Attribution and motivation: Gender, ethnicity, and religion differences among Indonesian university students. *International journal of higher Education*, *2*(1), p12.

Tams, S., Grover, V., & Thatcher, J. (2014). Modern information technology in an old workforce: Toward a strategic research agenda. *The Journal of Strategic Information Systems*, *23*(4), 284–304.

Taylor, C., Kirsch, I., Jamieson, J., & Eignor, D. (1999). Examining the relationship between computer familiarity and performance on computer-based language tasks. *Language Learning*, *49*(2), 219-274.

Terzis, V., & Economides, A. A. (2011). The acceptance and use of computer based assessment. *Computers & Education*, *56*(4), 1032–1044.

The Department of Commerce. (2011). *Cybersecurity, innovation and the Internet economy.* Retrieved from http://www.nist.gov/itl/upload/Cybersecurity_Green-Paper_FinalVersion.pdf

Tien, F. F. (2000). To what degree does the desire for promotion motivate faculty to perform research? Testing the expectancy theory. *Research in Higher Education*, *41*(6), 723–752.

Tran, M. (2013, December 13). National debate on 2014 GED changes. *Justice Center.* Retrieved from http://csgjusticecenter.org/reentry/posts/national-debate-on-2014-ged-changes/

Tuck, E. (2012). Repatriating the GED: Urban youth and the alternative to a high school diploma. *The High School Journal, 95*(4), 4–18.

Tyler, J. H. (2005). The General Educational Development (GED) credential: History, current research, and directions for policy and practice. *Review of Adult Learning and Literacy*, *5*, 45–84. Retrieved from http://www.ncsall.net/fileadmin/resources/ann_rev/rall_v5_ch3.pdf

Tyler, J. H., Murnane, R. J., & Willett, J. B. (2004). The devil's in the details: Evidence from the GED on large effects of small differences in high stakes exams. *Economics of Education Review*, *23*(4), 339–349. Retrieved from https://www.researchgate.net/profile/Richard_Murnane/publication/222578432_T he_devil's_in_the_details_Evidence_from_the_GED_on_large_effects_of_small_ differences_in_high_stakes_exams/links/00b4953bbf9f9766fe000000/The-devils-in-the-details-Evidence-from-the-GED-on-large-effects-of-small-differences-in-high-stakes-exams.pdf

Vroom, V. (1964). *Motivation and work.* New York, NY: Wiley.

Wainer, H., & Eignor, D. (2000). Caveats, pitfalls, and unexpected consequences of implementing large-scale computerized testing. *Computerized Adaptive Testing: A Primer*, *2*, 271–300. New York, NY: Routledge.

Zinth, J. (2015). GED, HiSET and TASC: A Comparison of High School Equivalency Assessments. ECS Education Trends. *Education Commission of the States*. Retrieved from http://files.eric.ed.gov/fulltext/ED558072.pdf.

Appendix: GED Scheduling Questions

Schedule GED® Test

NAME_____

School History

What is the highest grade you completed in school?
("completed" means you successfully attended the full school year and went on to the next grade; all options include home-schooling.)

○ I never attended school

○ Pre-school - 5th grade

○ 6th - 8th grade

○ 9th grade

○ 10th grade

○ 11th grade

○ 12th grade but did not graduate

○ I don't remember the highest grade I completed

What year did you complete your highest grade in school? _____

Please indicate the reason you did not complete school.

○ Academic (e.g., had low attendance, struggled with schoolwork, etc.)

○ Personal (e.g., cared for a family member, I had to get a job, etc.)

○ Both personal and academic

○ Neither personal nor academic

○ This does not apply to me, I was home schooled

○ This does not apply to me, I have a high school diploma from another country
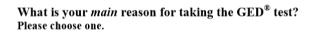
What is your current work status?

○ Working full time

○ Working part time

○ Not employed - but actively looking for work

○ Not employed - not looking for work

○ Not employed - permanent disability

○ Retired - not working

What was your total personal income over the past twelve months?

○ Under $5,000 or unemployed

○ $5,000 - $9,999

○ $10,000 - $19,999

○ $20,000 - $29,999

○ $30,000 - $39,999

○ $40,000 - $49,999

○ $50,000 - $74,999

○ $75,000 or more

Did you study to take the GED® test (e.g., on your own or in a classroom)?

○ Yes
○ No

What is your *main* reason for taking the GED® test?
Please choose one.

○ Personal Gain (e.g., gain personal satisfaction, serve as a positive example, etc.)

○ Work-related (e.g., get a new or better paying job, keep current job, etc.)

○ Educational Gain (e.g., to enter a technical college, 2 - 4 year degree program, etc.)

○ Special Requirement (e.g., court or corrections requirement, for public assistance, etc.)

○ Entrance to the military

Who or what was the *main* factor that convinced you to take the GED® test?
Please choose one.

○ GED Testing Service Website

○ Other Online Site

○ E-mail

○ Print Media (magazine, newspaper, brochure, flyer, or poster)

○ Broadcast Media (television, radio)

○ Friend

○ Family Member

○ Coworker or Boss/Employer

○ High School Counselor, Teacher or Official

○ Adult Education Teacher or Staff Member

○ Social Worker or Employment Counselor

○ Court or Corrections Official; Probation or Parole Officer

○ Military Recruiting Officer

○ Other (please specify)

Please provide your Social Security or Tax Identification Number_____

What is your gender?

○ Male

○ Female

○ Decline to answer

What is the primary language you speak at home? _____

What is your ethnicity?

○ Hispanic or Latino

○ Not Hispanic or Latino

○ Decline to answer

What is your race?
Select all that apply.

☐ Black or African American

☐ Asian

☐ Native Hawaiian or Other Pacific Islander

☐ Decline to answer

☐ American Indian or Alaskan Native

☐ None

☐ White

Can GED Testing Service contact you for future research participation? All information collected will be anonymous and kept confidential.

○ Yes

○ No

Terms and Conditions

By accessing this website and checking "I agree" below, you indicate your acceptance of GED Testing Service LLC's Privacy Policy, Terms and Conditions, and Use of cookies to support your GED Testing Service LLC experience and by providing your personal information you consent to the collection, use, transfer and disclosure of your personal information to GED Testing Service LLC, including transfer and disclosure of your personal information outside of the jurisdiction where you are located. You agree GED Testing Service LLC may transfer your personal information to its authorized third parties, the state or jurisdiction programs, adult education centers, test centers and the state or jurisdiction authorized third parties. Adult education centers and testing centers main purposes for using your test scores is to improve their educational programs, work with individuals to assist them in improving their scores, and to plan graduation ceremonies. In addition, some states or jurisdictions may have their own, possibly different, privacy policies that you should review.

○ Yes, I agree to the statements and policies listed directly above

○ No, I do not agree to the statements and policies listed directly above

☐ By checking the box you signify that you have read, understand and agree to the terms of the GED® Test Non Disclosure Agreement ("NDA"). If you have any questions please contact contracts@GEDtestingservice.com or call 1-952-681-3444.