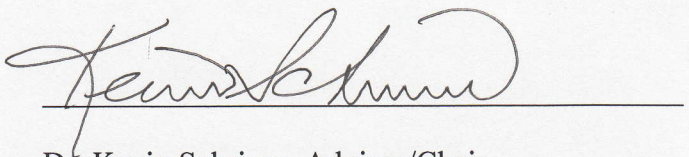
PREDICTING MISSOURI STUDENT ACT SCORES FROM END-OF-COURSE EXAMS

The undersigned, approved by the Department Chair of Graduate Studies in Education, have examined a dissertation entitled:

PREDICTING MISSOURI STUDENT ACT SCORES FROM END-OF-COURSE EXAMS

Presented by Michelle Wityk, a candidate for the degree of Doctor of Education and hereby certify that in their opinion it is worthy of acceptance.



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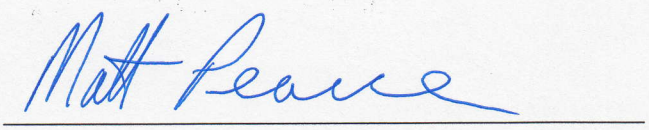

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PREDICTING MISSOURI STUDENT ACT SCORES FROM END-OF-COURSE EXAMS

A Dissertation
Presented to
The Faculty of the Graduate Education Department
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In Partial Fulfillment
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Doctor of Education

By

Michelle Wityk, B.S., M.S., M.A.

Dr. Kevin Schriver, Dissertation Advisor

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ABSTRACT

Since the Elementary and Secondary Education Act (ESEA) of 1965, many reforms have occurred in an attempt to improve academic equality for all students. Mandated state and national assessments are currently a part of the reforms for public education. Currently, the Missouri Department of Elementary and Secondary Education (DESE) has elected to measure students' content knowledge and progress, as well as college and career readiness, by using two high-stakes tests, the End-of-Course exam (EOC), and either the American College Test (ACT), the Scholastic Aptitude Test (SAT), the Computer Adaptive Placement Assessment and Support System (COMPASS), or the Armed Services Vocational Aptitude Battery (ASVAB). The purpose of this study was two-fold: to determine if EOC test scores in Algebra I, Biology, English II, and Government had predictive power for the ACT subtest scores in Math, Science, English, and Reading, respectively; and to determine what relationship other variables (grade point average [GPA], number of advanced courses taken, number of honors courses taken, and how many times the ACT test was taken) combined with the EOC test scores had on the predictability of ACT subtest scores. During this time of high-stakes tests, having a way to predict scores could be constructive. Raising test scores and improving overall student achievement are often the measures by which the public judges the productivity and success of local schools, thus affecting the reputation of the school and the system. The findings of this study should increase awareness of public high schools in Missouri. Knowing this information may assist other comparable Missouri schools with similar EOC and ACT data, so that they might utilize this study to improve their students' ACT scores.

CHAPTER ONE

INTRODUCTION

Over the last 50 years, educational reform has become a fundamental priority throughout the United States. Due to social concerns surrounding civil rights, disabilities, the disadvantaged, and the poor, the United States Department of Education (ED) and the Missouri Department of Elementary and Secondary Education (DESE) have developed and implemented several measures to provide equality and access, as well as to improve and monitor the level of teaching, learning, growth, and achievement for all American students (DESE, 2013, 2014a; U.S. Department of Education, 2003). Since the efforts of the Elementary and Secondary Education Act (ESEA) in 1965, many reforms and amendments have occurred in an attempt to improve academic equality for all students (DESE, 2012a; Hunt Kean Leadership Fellows, 2016; Missouri Governor's Office, 1993; U.S Department of Education, 2010, 2018). Mandated state and national assessments are currently a part of the reforms for public education. Unfortunately, according to the Nation's Report Card, which is developed by the National Center for Educational Statistics and the National Assessment of Educational Progress, long-term trends of test scores have not changed significantly for 17-year-olds in math and science from the 1970s through 2012 (Kena et al., 2016). In response to this stagnation, DESE elected to measure student learning by using two high-stakes tests, the EOC (End-of-Course) exam and either the ACT (American College Test), the Scholastic Aptitude Test (SAT), the COMPASS, or the Armed Services Vocational Aptitude Battery (ASVAB). These tests are the most recent tools determined by DESE to measure students' content knowledge and progress, as well as college and career readiness. Although state funding

allowed for annual ACT census testing during 2015, 2016, and 2017, Missouri no longer funds this assessment due to the reduction of the state assessment budget by $4,000,000 (DESE, 2017a). During this time of high-stakes tests, having a way to predict scores could be constructive.

Although there are many variables that contribute to college readiness, college entry tests such as the ACT or the SAT are often used as indicators and predictors of college success; however, they cannot stand alone. DESE has also adopted more rigorous standards in mathematics and communication arts. These standards are internationally benchmarked and are designed to reflect the degree to which students are ready for college or for a career. Proficiency levels in the EOC exams are also critical measures of student readiness. These exams measure student mastery in each course (DESE, n.d.-c) The Missouri State Board of Education has also adopted that students are required to have four English Language Arts credits, three math, three science, and three social studies in order to graduate from high school. Missouri is currently focusing on early pre-K education, academic rigor, and college readiness. Although public education seems to be taking on the majority of the responsibility for college or career success, the student and the parent are also responsible for being better prepared for the next steps.

Students are typically more motivated to perform well on achievement tests when there are personal consequences. According to Wolf and Smith (1995), consequence influences motivation, and motivation influences performance. Although some students lack motivation to try their hardest, it is important that all students give their best effort on state exams. While it may be difficult to measure motivation, many schools are using strategies to help students improve their motivation to do well on high-stakes tests. Much

is dependent on high-stakes tests for the student as well as for the district and all stakeholders. Showing student achievement to parents, the community, the state, and the nation is crucial as it directly reflects the abilities and skill levels of students in each school district.

Statement of the Problem

Many studies relate the ACT scores of students to other variables, such as gender (Budding, 2014), GPA (GPA; Noble, 1991; Noble & McNabb, 1989; Woodruff & Ziomek, 2004), coursework (Bassiri & Schulz, 2003; Noble, 1991; Noble & McNabb, 1989;) socioeconomic status (Wilkinson, 2015) the number of times a student takes the exam (Harmston & Crouse, 2016), and college success (Noble, 1991; Allen, Rudunzel & Moore, 2017.). Also, many studies have determined a significant relationship between coursework, GPA, and retaking the, where, on average, students gain approximately 0.8 points on the composite score on the second attempt at taking the test (ACT, Inc., 2017; Lanier, 1993). Because all students in Missouri are now required to complete four core area EOC exams before they graduate (English II, Biology, Government, and Algebra I) and because much is contingent on state exams (the ACT and the EOC) for the student, school, and community, showing predictive power between EOC tests and ACT subtests could provide crucial data for school districts. This information could help students be better prepared for the ACT, thus helping them potentially earn scholarships and acceptance into their chosen college or university. The information would also benefit Missouri schools in an effort to reach the "Top 10 by 20," a major improvement effort issued in 2009 and updated in 2015 by DESE, which was designed to assist Missouri students such that their overall achievement results in a Top 10 state ranking by the year

2020 (DESE, 2016b). The Show-Me Success initiative is the most recent strategic plan designed to help students graduate ready for success (DESE, 2017b). EOC exam scores dictate state accreditation and funding, but because it is not part of a student's transcript, making the test relevant to students becomes the task of teachers and administration.

One incentive some Missouri schools use is tying the EOC exam to the student's grade for that course. Some high schools even make the EOC worth some percentage of the overall grade and categorize it as the final exam. The ACT, however, is more relevant to many students because it affects earning college acceptance and scholarships. If students could see a connection that the EOC tests have predictive power for the ACT, then perhaps they would be more inclined to work harder in their courses, put forth their best effort on the EOC exams, and utilize the information gained from taking the EOC to become self-aware of the areas on which to focus in order to see improvement on the ACT. The information may also be used to gain understanding on how to better plan for scheduling future courses.

In further research in schools across Missouri, should the EOC exams prove not to be accurate predictors of the ACT, there are other options teachers and administrators can use to help improve scores. Boosting test scores is a major undertaking and requires focus and time. It demands a concerted effort by all stakeholders, including faculty and staff, students, and parents. It is likely to include data analysis on cognitive ability, attendance, and previous test scores (Wright, 2009), as well as teacher training in critical thinking and higher order skills (V.G. Smith & Szymanski, 2013), fidelity measures, practice testing and long-term preparation (ACT, Inc., 2017; Lanier, 1993), and incentives (Hout, Elliott, & Frueh, 2012). Some districts have used research-based

motivation and learning strategies to help students learn, to increase student motivation, and to ultimately raise their high-stakes exam scores. There are a variety of factors that the school can influence regarding achievement, including the quality and quantity of instruction, the learning environment, and motivation (Haladyna, Nolen, & Haas, 1991). However, some factors are not influenced by the school, such as family and home environment, maturity, and mental ability (Haladyna et al., 1991).

Purpose of the Study

Understanding how to improve test scores is an ongoing concern for teachers. Educators are expected to increase student scores on both state and national assessments to better meet the demands set by Every Student Succeeds Act (ESSA) and state standards. Raising test scores and improving overall student achievement are often the measures by which the public judges the productivity and success of local schools, thus affecting the reputation of the school and the system.

The ultimate goal of the No Child Left Behind (NCLB) Act of 2001 was for all students to be proficient or advanced on state tests (EOC exams) by the year 2014. It demanded that schools show improvement for all students, with consequences of reform or closure for those schools that failed (Rebora, 2011). The NCLB Act was amended and renamed due to the increasingly high number of schools who were given a failing score on Adequate Yearly Progress (AYP). The most current reauthorization is ESSA, which began implementation in 2015.

Not only are test scores used by the public to judge the success of the school, ACT scores are also a source of competition for students planning to attend college as the test currently plays a crucial role in determining whether students are admitted into the

college of their choice and for determining various levels of scholarship awards. According to the publication compiled by ACT (2016) entitled *ACT Scores Down for 2016 U.S. Grad Class Due to Increased Percentage of Students Tested, 2016,* "research indicates students who meet the ACT College Readiness Benchmarks are more likely to persist in college and earn a degree than those who don't" (p. 1). The purpose of these benchmarks is for colleges to make better informed decisions when accepting individuals to their universities. Regarding the validity of the benchmarks, the ACT claims that

> The benchmarks specify the minimum score students must earn on each of the four ACT subject tests to have about a 75 percent chance of earning a grade of C or higher and a 50 percent chance of earning a B or higher in a typical credit-bearing first-year college course in that subject area. (ACT, Inc., 2016, p.1)

For this reason, universities rely heavily on ACT data when making decisions on student acceptance.

High-stakes test scores are often utilized to rank the success of student learning in schools and to attract new members to the community. It is common for schools to post student names on ACT recognition walls much like student-of-the-month displays or trophy cases for sporting accomplishments. It is also common for schools to be comparatively ranked based on state assessments in various regions of the state.

Ultimately, conducting this correlational study and determining the predictive power of the EOC exam scores on the ACT subtest scores could affect all college-bound Missouri students by helping them to improve their ACT subtest scores and overall

composite scores, thus improving their chances for college acceptance and scholarships, as well as improving the overall perception of the success of the school for all stakeholders.

For the purpose of this quantitative study, the researcher examined the most recent data from a southwest Missouri school district, junior-level students. The focus was on determining which comparison had the most accurate predictive power: EOC English II to the ACT subtest scores in English, EOC Biology to the ACT subtest score in Science, EOC Government to the ACT subtest score in Reading, or the EOC Algebra I to the ACT Math subtest score. The secondary focus was to determine which, if any other variable (gender, GPA, the number of honors courses taken, the number of advanced courses taken, or the number of times the ACT was taken), combined with the EOC test score resulted in the highest ACT subtest score and ultimately the highest ACT composite score. Understanding these relationships could allow school systems to work more effectively toward meeting the needs of each student by identifying the area in which students need the most assistance. The correlations may also help districts to align curriculum and courses to ACT and EOC exams. Intervention and motivation strategies may also be embedded into the current curriculum in order to help students make greater gains on summative and high-stakes test scores.

The data gathered for this study may be used to help students, parents, counselors, teachers, and administrators in making decisions regarding variables that may affect current and future ACT scores. In addition to the study being a local resource comparing EOC and ACT data, other comparable Missouri schools with similar EOC and ACT data results could utilize the study to improve overall ACT scores of their students.

Research Questions

1. What is the correlation between Missouri EOC subject exam scores and ACT subtest scores?
2. What other variables have a relationship with ACT composite scores?
3. What are the predictors of ACT composite scores from those who complete the EOC exams?

In an effort to answer the questions listed above, the following null hypotheses (H_0) were also tested.

1. There is no statistically significant relationship between Missouri EOC subject test scores and ACT subtest scores.
2. There is no statistically significant relationship between the variables in this study with ACT composite scores.
3. There are no statistically significant predictors of ACT composite scores from those who complete the EOC exam.

The approach of the study was that of a quantitative analysis due to the fact that the data collected were numerical and statistical. A correlational and multiple regression analysis were used to determine the strength of the relationships, as well as any predictor variables and their strength. The EOC English test scores combined with the other variables were compared to the English ACT subtest scores to determine which had the more positive relationship and, therefore, more accurate predictive power. The EOC Biology test scores were combined with the other variables and compared to the ACT Science subtest scores, the EOC Government test scores were combined with the other variables and compared to the ACT Reading subtest scores, and the EOC Algebra I test

scores were combined with the other variables and compared to the ACT Math subtest scores. It was expected that the comparative tests paired with the highest number of advanced and honors courses taken variables would display a direct correlation and, consequently, serve as more accurate predictors for the ACT exam.

Conceptual Framework

In 1983, the National Commission on Excellence in Education released *A Nation at Risk*, which argued that the American educational system was falling behind that of other countries. The document called for reform and for schools to develop rigorous standards to increase student achievement (National Commission on Excellence in Education, 1983). More recently, the NCLB of 2002, ESSA of 2015, and the Missouri School Improvement Plan (MSIP) 5 of 2013 mandated that all students graduate college and career ready. Missouri's accountability measures for this requirement are the EOC and the ACT exams. The conceptual framework of the study was based upon the work of Braden and Schroeder (2004). Their research regarding accountability and high-stakes testing included helping everyone involved in testing to better understand the results, using the results to plan for the following year with the goal of increasing student learning, bringing scientifically-based teaching methods into the classrooms to improve student learning, and helping those with test anxiety to cope. This research, therefore, can help school systems make better decisions regarding testing and learning, which ultimately help with meeting the requirements of the NCLB, ESSA, and MSIP 5. These reforms hold schools accountable for evidence of student learning through testing. The objective of this study was to expand on DESE's proposed studies (examining the

relationship between EOC and the ACT college readiness benchmarks) to determine if EOC subject tests and other variables are accurate predictors of ACT subtest scores.

Theoretical Framework

Because so much is riding on high-stakes testing in education today, it is imperative that tests such as the ACT and the EOC are fair, valid, and reliable. Over time, these tests have undergone change, but one aspect of their consistency includes that they are both constructed on test theory using national and state standards. According to Verhelst (2014), test theory has two main divisions; classical and item response. These theories are what test producers should take into account when constructing high-stakes tests and are what led to the standardization of the ACT. Measuring what students truly know is a complex process and an educational tool which helps educators determine what students really know, and whether or not they are college and career ready.

Classical test theory is a well-established, quantitative approach that is still in practice today. The basic concept of this theory is the observed test taker's score, or sometimes referred to as the measurement. It is something that can be verified by inspection of the completed test form. If the student were to take the same test under the same circumstances, they may or may not obtain the same test score as there are some factors in test-taking which are not controllable. If the student were to hypothetically take the test many times, the average of these scores would be called a true score. Because students typically do not take the same test multiple times, but rather only once, the single test score is then considered as being randomly selected from the many hypothetical observable scores. The difference between the observed score and the true score is known as the measurement error (Verhelst, N., 2014). Classical test theory

considers the reliability of a test's measurement in that there should be little variance or error between test scores (i.e. test measurements from today should be nearly the same as test measurements from tomorrow) (Janssen et al., 2014)

Item response theory is easily used in multiple choice tests. A probability is calculated for a correct response based on a relationship between the test taker's ability and the difficulty of the question. When the ability level of the test taker and the difficulty level of the question are the same, the test taker has a 50% chance of answering the question correctly. When changes occur in either, the probability shifts accordingly. An advantage of item response theory is that by plotting the probabilities on a true interval scale it is possible to understand how test items perform independent of the sample (Janssen et al., 2014). This process is used to determine the quality of test questions. Poor questions may be thrown out during test revisions. Because the ACT and the EOC are two high-stakes tests that rely heavily on the multiple choice format, test producers often use field testing and item response theory to determine the quality of test questions.

The role and function of assessment within education becomes vitally important when one considers the different uses that tests may have and that test developers must consider to ensure that tests are fair, appropriate, and valid. Classic test theory and item response theory are two theoretical frameworks that can be used to understand the quality of test items for the populations being assessed (Janssen et al., 2014). Test producers of high-stakes assessments should take into account and utilize these methodologies when designing, constructing and employing the exams.

Limitations

The limitations for this study were relative to the state of Missouri and included the following: this study was conducted using data from a southwest Missouri high school, which may have a dissimilar demographic population to other Missouri schools, thus the transferability of the results may be limited. Comparing individual EOC scores and individual ACT scores amongst Missouri students statewide was limited due to inability to access the data. Only averages from aggregate data from DESE were used to conduct the study, compiled from all accredited Missouri school districts.

Additional limitations may have resulted from the course options or curriculum offered to students at the southwest Missouri high school compared to other Missouri schools. It is possible that other schools may offer sequential or possibly more rigorous courses based on school culture. High school GPA may have been another limiting factor as some schools used different scales, such as the 11- or 5-point scales.

This study was not interested in whether or not students used their ACT scores to attend a 4-year college or university, which is the most common reason students take the ACT exam, but rather only whether or not EOC test scores were accurate predictors of ACT subtest scores. It is possible that the math EOC (Algebra I) was less rigorous than the ACT math subtest and, therefore, the ACT math subtest may have been better correlated to College Algebra. It is also possible that a student may have chosen a less rigorous pathway in math courses after Algebra I, which may have affected the level of content knowledge to be better prepared for the ACT math subtest. Not all Missouri students took Algebra I as freshman-level students, Biology as sophomores, English II as

sophomores, and American Government as juniors, so the timing and alignment of the EOC tests with the ACT test may not have been the same at all Missouri schools.

Delimitations

The delimitations for this study included the following: The study was limited to public high schools within the state of Missouri. It did not include private or charter schools, assuming that the culture and climate may vary from that of a public school setting. Students can take the ACT at any grade level, but only junior level students' data were used.

Assumptions

The assumptions for this study included that if correlations were found in the collected data from the southwest Missouri high school, then the same would be true for all students of other Missouri high schools. By utilizing average EOC exam scores and average ACT scores from districts throughout Missouri and comparing those results with the southwest Missouri high school's data, the results from this study can be extended to the whole of the state to any district with comparable data.

Design Controls

The research format for this study was of a quantitative nature. Average data for all Missouri school districts were collected from the DESE Missouri Comprehensive Data System (DESE, n.d.-g). Data of individual scores were retrieved from the southwest Missouri high school's Student Information System (SISK12). No student names were used. The scores were then analyzed using the Statistical Package for the Social Sciences (SPSS) software to determine correlational and multiple regression statistics.

Definition of Key Terms

· American College Test (ACT): American College Testing Program assessment, which was developed and introduced for the first time in 1959. It was used to ensure that students were academically prepared for higher education (Atkinson & Geiser, 2009).

· ACT composite: Average of the four subtest scores, ranging from 1-36 (ACT, Inc., n.d.-b)

· ACT subtest: There were four subtest scores that combined and averaged to make the composite score. The subtests included math, reading, English, and science (ACT, Inc., n.d.-b)

· DESE: Missouri Department of Elementary and Secondary Education; this is the administrative branch of the State Board of Education that works with educators, legislators, government agencies, community leaders, and citizens to maintain a strong public education system (DESE, n.d.-i)

· End-of-Course (EOC): This exam was created from the Missouri Assessment Program. It assesses the level of mastery of the state standards and was given to high school students who were enrolled in Government, Biology, English II, and Algebra I (DESE, n.d.-a)

· Elementary and Secondary Education Act: 1965 (ESEA); this was an act to reform education as a result of the War on Poverty enacted by Lyndon B. Johnson. This must be reauthorized every 5 years (U.S. Department of Education, 2010.)

· Every Student Succeeds Act: President Obama (ESSA); this is an updated version of No Child Left Behind (NCLB; see below) that includes provisions for the

disadvantaged and high needs, ensures college and career readiness, high quality preschools, and many other provisions (U.S. Department of Education, 2018).

· No Child Left Behind (NCLB): In 2002, Congress amended the ESEA and reauthorized under this new name. The amendments included closing the achievement gaps for underrepresented subgroups and super subgroups and accountability for schools to ensure student academic achievement and progress (Schmidt, 2008).

. SINI: Schools in need of improvement (U.S. Department of Education, 2015).

· Subgroups: Asian/Pacific Islander, Black, Hispanic, American Indian, White, multiracial, students with disabilities, English language learners (ELL), and low-income students (DESE, 2012a).

· Super subgroups: Unduplicated count of all students in a school or local educational agency (LEA) belonging to at least one of the following individual subgroups: Black, Hispanic, students with disabilities, ELL, or low-income students (eligible for free/reduced price school lunch; (DESE, 2012a).

Summary

Currently, educators and students alike are bombarded with required state and national assessments. The NCLB Act required students to be assessed at the national level, thus Missouri uses the ACT as a nationally recognized test. All Missouri junior-level students were required to take the ACT exam in the 2014-2015, 2015-2016 and the 2016-2017 school years. Currently, under the new ESSA legislation, there is more flexibility such that students must either take the ACT, the ACT WorkKeys, or the ASVAB test to graduate.

Since 2014, DESE (n.d.-h) has required students to be assessed at the state level to determine whether or not the student had mastered the Missouri Learning Standards (MLS). Therefore, high school students had to complete the mandated EOC exams after the completion of certain state-required courses. These courses included Algebra I, English II, Biology, and Government in order to graduate.

Because the ACT exam has so much depending on it (college acceptance, scholarships, accreditation, etc.), assisting students in public education to be better prepared for taking this high-stakes test should be a priority. Allowing teachers and students to examine the targeted areas needed for improvement and embedding motivation and intervention strategies into the current curriculum could make a difference in helping all students, teachers, departments, and schools reach their goals and meet the college and career readiness standards.

Chapter One presented an introduction of the study through a description of the background, conceptual underpinnings and theoretical framework, the purpose for the study, a hypothesis and prediction, limitations, delimitations, assumptions, and key terms. The study was conducted to determine the overall relationship between EOC test scores and ACT subtest scores so that students may benefit in more accurately preparing for high-stakes tests. The study was also used to determine the predictive power from EOC exam scores paired with other variables such as GPA, the number of honors courses taken, the number of advanced courses taken, or the number of times the ACT was taken. These variables may also affect the predictability of ACT subtest scores. Chapter Two presents a literary review related to the research questions. Chapter Three describes the methodology and techniques applied to the collected data for analysis. Chapter Four

summarizes the results of the data generated and analyzed. Chapter Five presents a discussion of the study findings related to the research questions and the literature. The final chapter also includes the implications of the findings for future research or practical utilization.

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

Much research has been conducted on how gender, GPA, socioeconomic status, and many other variables affect ACT test scores; however, little has been researched on the predictive power of EOC scores on ACT test scores. This study intends to fill this gap in the existing literature by determining the relationship between certain variables and the ACT composite score, and the degree to which these variables have predictive power on the ACT. In the spring of the 2014-2015, 2015-2016 and 2016-2017 school years, all Missouri junior-level students were required to take the ACT, which provided DESE with data to determine how many students were college and career ready. Because this data does not always align with data reported from the EOC exams, DESE commissioned the Center for Assessment to design studies that examined the relationship between EOC content-area exams and ACT subject-area exams (DESE, 2014b). These studies were in progress at the time of the current study. As more pressure is placed on teachers and districts to perform well on state exams, understanding the history of accountability, state testing, and the variables that affect testing may assist educators in predicting scores and improving them.

Educational reform has been occurring for over 50 years in an effort to improve schools. The review of literature is broken down into six areas. The first area reviews studies that described the history of federal accountability from 1983 to the present, which includes *A Nation at Risk* (National Commission on Excellence in Education, 1983), the ESEA, the NCLB Act and the ESSA; Missouri's accountability, which

includes the MSIP; and high-stakes tests such as the Missouri Assessment Program (MAP), EOC, ACT, and the SAT. Additionally, overviews are given on the effects of practice tests, grades and coursework, motivation, and intervention strategies on improving test performance.

History of Federal Accountability

To gain an understanding of why the ACT and EOC tests are being used to measure student abilities in Missouri, one must become aware of the educational reform that has occurred over the last half of the century. In research conducted by Hargreaves and Shirley (2009), the researchers suggested that the 21st century requires new ways of affecting social and educational change. They described four ways that define global educational policy and practice in their work *The Fourth Way (*Hargreaves and Shirley, 2009). The First Way of approaching reform in the 1960s was defined by professional freedom and state support, innovation and new social movements, inconsistent leadership, and uneven school performance. Improvements in education were based on ideology and intuition rather than on evidence. In the 1980s, the Second Way of educational prescriptions and competition began, which was fueled by publicized school rankings and test scores, and included inequity, uniformity, and standardization. This resulted in a reduction of student learning, leadership capacity, and teacher motivation.

In the late 1990s, the Third Way emerged. It attempted to balance accountability and professional community but rather resulted in quick-fix, short-term solutions for lifting achievement scores. This is currently the dominant reform strategy of collecting and analyzing data and tracking students, teachers, and schools. The Fourth Way includes a new plan for successful reform that integrates teacher professionalism, community

engagement, government policy, and accountability, where student learning and achievement will improve through ambitious improvement targets, accountability that tests samples, and evidence-informed teaching. A national vision, professional collaboration, and local decision making with less government control are all elements of the most recent reform (Hargreaves & Shirley, 2009).

While districts' goals are to eventually arrive at the Fourth Way of thinking, many schools are still stuck in the previous ways. Before 1965, a great divide existed between the "haves" and the "have nots" of schools. Success in school was believed to be linked to success in life. Educational decisions were left up to states and districts, resulting in large discrepancies. Throughout time, strategies for teaching and student learning have been ever changing, as have been the achievement and accountability measures. Early forms of high-stakes testing included exams that were required for receiving a diploma, such as in Florida, Georgia, Indiana, Louisiana, Alabama, Maryland, Minnesota, Mississippi, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, South Carolina, Tennessee, Texas, and Virginia (Amrein & Berliner, 2003).

Before the ESEA of 1965, minute attention was given to education at the federal level. Educational decisions were made at the local and state levels (McAndrews, 2015, tying into Hargreaves and Shirley's (2009) Second Way. Consequently, several discrepancies existed between states for the quality and equity of the education students were receiving based on the funding states were able to provide. Budgets for classroom teacher salaries, student-to-teacher ratios, buildings, and equipment were not comparable throughout the nation (Schmidt, 2008). As such, the ESEA of 1965 was an attempt to

implement educational and social reforms. Accountability and national educational standards were a result of this governmental reform (McAndrews, 2015).

The ESEA was designed, written, and passed due to the War on Poverty, which proposed that inadequate education and poverty were directly linked. The focus of ESEA was to allocate federal funds to assist in educating the economically disadvantaged children through Title I money (Schmidt, 2008.) Public schools in which 40% or more of the student population experience poverty were eligible for Title I funding (McAndrews, 2015). Title I funds were expected to be utilized to provide extra academic support and learning opportunities in order to help low-income students become proficient on state academic achievement standards. This program also required states to be accountable for improved student learning, thus reflected in statewide testing (U.S. Department of Education, 2015).

The ESEA required states to develop standards of what they expected students to know and do (Hunt Kean Leadership Fellows, 2016). They were required to test at the elementary, middle, and high school levels annually and were expected to show improvement on assessments (also known as AYP). The assessments, subject matter, AYP expectations, and failure to meet AYP criteria were determined by each state. Schools that failed to meet AYP criteria suffered economic consequences and/or assessment inclusion targets (Braden & Schroeder, 2004). Failing one year resulted in no consequences, but failing multiple years may have ultimately resulted in drastic changes, such as restructuring the school.

In 1983, Ronald Reagan's Secretary of Education T. H. Bell and the National Commission on Excellence in Education published *A Nation at Risk: The Imperative for*

Educational Reform. It was alarming for most citizens in that it claimed that the American public education system was failing, and that if reform did not happen soon, our nation's economy would be severely compromised (Nichols, Glass, & Berliner, 2005). The report included concerns regarding low academic proficiency compared to the international community despite the passing of the ESEA. The reform called for increased community and parental involvement, motivated and highly trained teachers, and increased involvement from the federal, state, and local governments.

In the years following Reagan's *A Nation at Risk* (National Commission on Excellence in Education, 1983), high expectations, accountability, and an equal education for all (including those who were considered to be from disadvantaged backgrounds) were accompanied by many federal initiatives, including the reauthorization of the 1965 ESEA. With each new initiative came increased demands on students and teachers, laying the foundation for federal intervention at the state level, directing states toward a single goal of 100% of students reaching the level of proficiency by implementing a system of accountability and standards-based grading (Schmidt, 2008). For many policy makers, transforming schools had become a priority, thus including high-stakes testing as part of the transformation in order to measure district improvements. However, merely putting forth initiatives did not bolster student achievement, and more changes would soon come to the residing legislative educational reform acts.

Approximately 11 years later, in 1994 President Clinton signed the Goals 2000: Educate America Act into law. This program provided Title I schools with funding for professional development, technology, accountability, and changes in governance (Schmidt, 2008). One of the key purposes of this act was to identify common standards

or benchmarks for student achievement. According to Earley (1994) the eight national education goals in the law included:

By the year 2000, all students will begin school ready to learn; the high school graduation rate will increase to 90%; all students will leave grades 4, 8, and 12 having demonstrated competency over challenging subject matter including English, mathematics, science, foreign languages, civics and government, economics, arts, history, and geography, and every school in America will ensure that all students learn to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment in our Nation's modern economy; the Nation's teaching force will have access to programs for the continued improvement of their professional skills and the opportunity to acquire the knowledge and skills needed to instruct and prepare all American students for the next century; U.S. students will be first in the world in mathematics and science achievement; every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship; every school in the United States will be free of drugs, violence, and the unauthorized presence of firearms and alcohol and will offer a disciplined environment conducive to learning; every school will promote partnerships that will increase parental involvement and participation in promoting the social, emotional, and academic growth of children. (p. 3).

It was this law that paved the way for the NCLB Act of 2002. In order to speed up the progress of meeting national standards, Congress decided to revamp the ESEA framework, as they were dissatisfied with the level and pace at which public education

was advancing. The ESEA was amended and reauthorized in 2002, and was renamed the NCLB (McAndrews, 2015).

In 2011, the Obama administration passed the NCLB Act, which aimed to improve educational outcomes by increasing teacher qualification standards and annual testing; it increased accountability through standardized testing and increased funding for public schools; it introduced school choice and increased the quality of education and it attempted to close the achievement gaps. It allowed for waivers to be utilized for many sections of the NCLB, including AYP. In exchange for the waivers, schools agreed to implement differentiated accountability systems that would support low-performing schools, teacher and principal evaluation systems that lead to improved student achievement, and college and career ready standards as well as aligned assessments. Because many states were not meeting AYP, 45 states applied for waivers and 43 were granted (Hunt Kean Leadership Fellows, 2016).

NCLB was designed to include the federal government for the purpose of ensuring that all students would achieve academic progress, reaching a level of academic proficiency within a time period of 15 years; furthermore, all students would receive an equal education (Schmidt, 2008). The act also included accountability for public schools to ensure that all students would meet college-and-career readiness standards at the point of high school graduation. States that did not initiate a plan of action or meet the predefined goals risked the loss of billions of dollars in Title I funding.

The NCLB was more specific than the ESEA in that it defined more explicitly assessment and accountability. States and local districts were required to meet AYP where students were expected to meet the proficiency levels in reading, language arts,

and mathematics. It required yearly mathematics and reading tests in Grades 3 and 8, and once in high school, as well as a yearly science assessment in elementary, middle, and high school. Tests were designed and fitted to state expectations; these tests were then approved by the U.S. Department of Education (Schmidt, 2008). The tests allowed for the monitoring of student progress, and the data were used to determine if schools were making AYP toward all students being proficient.

In addition, NCLB measured the progress of students in various groups by looking at specific data. Student groups included Black, White, Asian, Hispanic, Indian, English-language learners, disabled, and low-income status. Schools that received federal money were required to track and meet AYP criteria for all subgroups (Braden & Schroeder, 2004). This data and the accountability component were found to be "a ground-breaking step in educational policy as well as a major piece of civil rights legislation" (Hall, 2013). The NCLB required all states to show progress toward 100% of all students meeting the state proficiency standards (Braden & Schroeder, 2004), an impossible goal for schools to meet.

Funding was withheld from schools that failed to meet the accountability requirements. For schools that failed, states were required to provide corrective measurements and funding for 2 consecutive years to assist with correcting the problems. Those school districts were identified as "In Need of Improvement" and may have been required to restructure if the corrective actions were not successful. Parents were informed of the AYP status and were allowed to transfer their children to another school in the district that did meet AYP. Any economically disadvantaged student attending a school considered in need of improvement for more than one year was also

provided with free supplemental services, such as tutoring. Schools were also required to develop a plan if they were in need of improvement. This plan was required to include instructional strategies from scientifically based research, and the school was required to spend at least 10% of the NCLB funding on professional development (Braden & Schroeder, 2004). Because all students deserve the best education possible no matter where they may reside, governmental acts were designed and put into action throughout the years attempting to reduce the educational discrepancies families faced.

Schools not meeting AYP criteria were given state money and inclusion targets, but were likely to lose autonomy in determining teaching methods and materials as well as freedom for individual classroom teachers. These schools would be required to restructure their practices by adopting scientific and research-based practices instead (Braden & Schroeder, 2004). Involving the government to oversee more closely the progress of these schools was believed to add accountability and timeliness of meeting expectations. Consequences for schools not meeting AYP were structured by the number of years the school did not meet accountability. In other words, schools not meeting the requirements for 2 years in a row had less severe consequences than schools that did not meet the requirements for 4 consecutive years.

School districts not meeting the AYP requirements for 2 consecutive years were classified as Schools in Need of Improvement (SINI; U.S. Department of Education, 2015) and were required to develop a 2-year improvement plan. Many local, state, and federal agencies have funding to help these schools implement their improvement plans. Students who attended these schools were allowed to transfer to other non-SINI schools and the district were required to provide transportation. Those schools not meeting the

requirements for 3 consecutive years received the same as those in the second year, plus students from low-income families received the opportunity for supplemental services, like tutoring and remedial classes. Schools not meeting AYP for 4consecutive years were required to replace school staff, extend the school day or year, change the school's internal organizational structure, and create new curricula, plus all the same consequences as schools in the second and third years of not meeting AYP. Finally, schools in the fifth year must be structured, meaning that they would reopen as a charter school, replace all or most of the school staff, or the state might take over the school's operations, plus all the other sanctions of schools in the second, third, and fourth years of not meeting AYP (Nichols et al., 2005).

However, sanctions were not the only method used to motivate school districts under NCLB. Rewards were also received for schools closing the achievement gap. These benefits may have included academic achievement rewards, designations as "model schools" for other low-performing schools, or financial awards to teachers who had made major gains. This, in and of itself, led to district issues such as teachers cheating to be rewarded more compensation and/or to avoid possible termination due to poor test scores (Nichols et al., 2005).

The NCLB Act (U.S. Department of Education, 2010) also included that national and state assessments be utilized to determine the level at which students were prepared for higher education and vocation, such as the ACT, the WorkKeys, and the ASVAB tests. Many states additionally established systems that used these test scores to determine teacher effectiveness. Many educators believe that value-added modeling (VAM) is one system that better determines teacher effectiveness, identifying the best

and worst teachers (Gordon, Kane, & Staiger, 2006). This systematic approach is based on student achievement growth. Proponents of this test-based teacher evaluation system accredited growth in student achievement as a stronger predictor than those currently being used, such as walk-through evaluations, licensure exam scores, or advanced degrees (Hanushek & Rivkin, 2006). For these reasons and more, community stakeholders put pressure on students and teachers to earn top-ranking scores. Having a way to predict scores on high-stakes tests could be advantageous to both students and teachers during these competitive times for teacher effectiveness, state ranking, college acceptance, and financial scholarship awards for graduates.

Each prior reauthorization increased the federal government's role in public education in an effort to improve many shortfalls such as academic performance, achievement gaps in subgroups, and low international rankings. The goal of the ESEA was to provide an equal education for all, regardless of their race or social status. Tools and resources were provided for students with disabilities, and billions of dollars were distributed to schools that complied with the new integration laws. The main goals of the NCLB Act was to ensure that students in every public school achieved priority learning goals in safe classrooms taught by competent, well-prepared teachers. Accountability was required through academic progress shown on state and national tests.

On December 10, 2015, President Obama reauthorized the NCLB as ESSA (see Appendix A). This act replaced the NCLB Act from 2002 and was fully operational in the 2017-2018 school year. According to Rebora (2011) in an *Education Week* article regarding NCLB, several changes were made to the act, with the main difference being that states were given more autonomy, as the U.S. Department of Education became less

involved. States still had to submit accountability plans, along with the names of the peer reviewers; states were able to choose their own goals related to proficiency on tests and for ELL, as well as for graduation rates; and gaps had to be closed in achievement and graduation rates for all groups that were the furthest behind in reaching the goals and expectations previously determined (Rebora, 2011). In addition, for ELLs, schools would be required to incorporate their test scores into the mix after the student has been in the country for three years (Hunt Kean Leadership Fellows, 2016). These changes should allow districts more freedom in their goals and expectations.

In ESSA, the Annual Performance Reports (APRs) replaced AYP from the NCLB Act. AYPs used labels of improvement, corrective, and restructuring for accountability; however, APRs now are based on the performance standards, including student growth, science, social studies, several college and career readiness indicators, attendance, and graduation rate; these are reviewed at the district level for accreditation purposes (Hunt Kean Leadership Fellows, 2016). These changes to APR allow for the appropriate attention and tailored interventions to be given to the needs of each group rather than grouping all students together as disadvantaged or as super subgroups and masking their specific needs. The APRs also include a high-needs subgroup where students may only be counted in one of the following subgroups: ELL, Black students, Hispanic students, low SES, or students with disabilities (DESE, 2012a).

In addition to these ESSA changes, all states are expected to incorporate accountability indicators in their states' plans. According to Klein (2016), states must incorporate at least four accountability indicators into their plan, with three of the four being academically related. Indicators include items such as proficiency on state tests,

English-language proficiency, and another indicator, which can be broken out by subgroups; however, super-subgroups (where students belonging to at least one subgroup can only be counted once) are prohibited for testing accountability purposes. The last indicator must include either student or educator engagement, postsecondary readiness, access to and completion of advanced coursework, school safety or climate, or whatever else the state might deem important to address. States must also figure in participation rates on state tests, and high schools must also include graduation rate for one of the three academically related indicators (Klein, 2016). Accountability indicators are utilized to assure school districts' responsibility for student proficiency.

With permission from the secretary of the U.S. Department of Education under the ESSA's Innovative Assessment Pilot, seven states (or groups of states) could apply for permission to try local tests for a limited time, and states may also develop their own opt-out laws together with deciding how to handle states not meeting targets (Klein, 2016). States must also adopt rigorous and challenging curriculum, such as Common Core, and the U.S. Secretary of Education cannot force a set of standards on these states.

The Common Core State Standards (CCSS) were developed under the National Governors Association and the Council of Chief State School Officers; they were designed to focus on two general areas: literacy and numeracy. These two standards are not only applicable in English language arts and math courses, but they are expected to translate into other subject specific areas as well, such as science and social studies (Conley, 2011). By using these new standards, the goal is that students will learn at a deeper, more complex level in all subjects, making them better prepared for college and careers. Traditional shallow learning and memorization is a practice of the past, a

technique that has not been proven effective for students to be college and career ready. The Educational Policy Improvement Center concluded that college-level course instructors expect new students to be proficient in five key cognitive strategies: problem formulation, research, interpretation, communication, and precision and accuracy (Conley, 2011). Students who learn these skills through the CCSS curriculum are expected to be better prepared for assessments and to succeed in the next stage of their lives. In June of 2010, 41 states and the District of Columbia decided to replace their curriculum with the CCSC; however, since then many states have pulled away from their commitment to implement Common Core and its related assessments (CCSS Initiative, 2018b). Some states have chosen to modify the standards to fit better with their district needs.

Some of the ESSA highlights include preschool development, innovation, the arts, gifted education, and parent engagement. Schools have been making curriculum changes in order for students to be college or career ready, extra funding is available for lower performing schools, and Common Core is no longer required. Lastly, teacher evaluations through student outcomes are no longer included in the act, nor is the "highly qualified teacher" law being used, whereby teachers were required to have a bachelor's degree, full state certification, and proof they were knowledgeable of the content of each course being taught. Instead, grants are available to districts with teachers who want to try performance pay and other teacher-quality improvement measures (Klein, 2016). These changes have made the latest federal guideline easier for states to follow.

When states are not in compliance with ESSA expectations, the government will then intercede. According to Klein (2016), every 3 years states will identify and intervene

with schools that fall in the bottom 5%, where graduation rate is 67% or less, and where subgroups of students have been identified as struggling. In these schools, districts will develop a plan to work with teachers, and states will monitor the effects of the plan. If after 4 years the school is still struggling, the state will be required to make its own plan or take over the school. In schools where subgroups continue to struggle, a "comprehensive improvement plan" will be implemented. Schools would also only be able to give alternative tests to 1% of the overall student body. This includes special needs students. In ESSA, up to 7% of Title I funds may be used for educating students in poverty (Klein, 2016). This is up from the 4% previously allowed in the NCLB Act. These changes were in an effort to pinpoint specific gap areas so that they may be addressed and corrected, giving these areas the attention they deserve.

With the new ESSA act in place, states will still have to test students in math and reading each year in Grades 3 and 8, and once during high school. Science tests must be given at least once during Grades 3-5, 6-9, and 10-12. The assessment must provide information about student achievement or growth; the data from these tests will still be broken out into subgroups (racial minorities, ELL, poverty, special education, etc.). Testing will still be a part of the state's accountability systems, but other factors must also be incorporated into the system such as school climate, teacher engagement, and success in advanced coursework. With state permission, the ACT is a nationally recognized test that may be used to measure student achievement or growth (Klein, 2016). Many states opt to use the ACT as their method of assessment to measure achievement at the high school level.

At the time of the current study, ESSA is the most recent attempt at modifying educational reform; it has been in effect since 2015. One focus of this act is that every district prepares students to be college and career ready upon graduation (Hunt Kean Leadership Fellows, 2016). In this process, it is necessary to provide the education and the pathway for students to be better prepared for what awaits them upon graduation.

History of Missouri Accountability

In 1993, Governor Mel Carnahan signed into law the Outstanding Schools Act (Senate Bill 380), which addressed two issues: the quality of Missouri schools and the inequality of state funding for education. Before this act, funding for schools was based primarily on property values, which resulted in more money for schools in the more affluent neighborhoods. This new system under SB 380 increased taxes on corporations and the wealthiest 11.5% of Missourians, which resulted in a $310,000,000 increase in funding for education. Another $50,000,000 in budget cuts was added to the funds and together the $360,000,000 as distributed more equally across all Missouri schools **(**Missouri Governor's Office, 1993). This financial redistribution allowed for much needed changes in Missouri's educational systems.

Great schools are one of the most important factors that areas can offer to businesses, employees, and families. A well-educated and skilled workforce attracts businesses and industries, which greatly contributes to the economic success of a state. The Outstanding Schools Act was designed to reform schools by strengthening education and producing skilled graduates who were career ready, thus securing Missouri's economic future **(**Missouri Governor's Office, 1993).

Part of the reformation of the Outstanding Schools Act was strengthening the curriculum in schools. The three Rs were expanded upon by enhancing science and math education, language, and communication, as well as vocational programs. The focus was to ensure that students not only increased their knowledge base in these areas, but that they also improved their critical thinking skills to be able to problem solve and succeed throughout life (Missouri Governor's Office, 1993). These new performance standards were developed in conjunction with the national standards by the State Board of Education, education experts from across 20 states, and committees composed of educational professionals, business, civic, and education leaders. Students who met these standards would be well prepared to become successful in life and be productive citizens (Missouri Governor's Office, 1993).

In addition to the new curriculum and performance standards, a new statewide assessment system was implemented to ensure schools and districts were accountable (see Missouri Assessment Program section below). It was designed to measure the degree to which students met the performance standards, the level of students' knowledge, and whether or not the student could apply this knowledge to solve complex problems. The new system compared the performance of all schools across the state not against each other, but rather against their own performance from year to year. If schools failed, the entire team of teachers, principals, superintendents, school board members, and state officials was held accountable (Missouri Governor's Office, 1993). Placing accountability on all parties ensured greater ownership of test scores.

In order to guarantee that all Missouri students received an equal opportunity to education and were college and career ready, the Missouri School Improvement Plan was

established in 1990. It was used to ensure the state had an accountability system for reviewing and accrediting public school districts. The fifth revision was being utilized at the time of the study, thus the title MSIP 5, which focused on the Performance Standards as well as the Resource and Process Standards. The Performance Standards included state tests (EOC, MAP, ACT, SAT, ASVAB, etc.), successful completion of advanced courses, career education and college placement, graduation and attendance rates, and subgroup achievement. The Resource Standards included academic content per grade level, class size ratios, staff ratios and qualifications, and teacher planning time. The Process Standards included best practices for teachers and leaders, instruction, and governance. These measures were designated to promote innovation and continuous improvement, recognizing achievement and continuous growth of all students. According to DESE, the resource and process standards have not affected accreditation since 2006 as they serve only to guide districts when investing their resources (DESE, 2012b).

In July of 2012, Missouri's ESEA Flexibility Request was approved by the United States Department of Education, which created an opportunity for Missouri to use its own reliable and aligned comprehensive accountability system as outlined in the MSIP 5. At the time of the study it was being revised and MSIP 6 will soon go into effect.

As a result of the 2014 House Bill 1490, the Missouri Learning Expectations were developed, and a group of educators across the state collaborated to develop resources to fulfill these expectations. The documents included grade-level and course expectations arranged by domains and strands. The purpose of these documents was for developing benchmarks, summative tests, and high-stakes tests (DESE, n.d.-d). However, educators could use these documents in order to provide understanding.

As of 2018, it would appear that these tighter governmental reigns are viable for Missouri as there are no unaccredited school districts and 6 that are provisionally accredited. All of the remaining 512 school districts are accredited (DESE, 2018). Moreover, fear of losing federal funding has proven to spark school districts into compliance.

In addition to the standards, APRs are generated for every district and school. They are examined to show how well each school is meeting the standards and to help determine which supports and interventions are needed for improvement. MSIP 5 also provides the criteria for schools to be identified and recognized as high-performing schools for being models of excellence (DESE, 2014a). The goal of MSIP 5 is to hold Missouri schools accountable and to adequately prepare all students for college and career readiness. The ultimate goal for Missouri is to use this plan to guide schools in an effort toward earning a Top 10 ranking by the year 2020 (DESE, 2014a). This initiative includes four goals and objectives:

> All Missouri students will graduate college and career ready; all Missouri children will enter kindergarten prepared to be successful in school; Missouri will prepare, develop and support effective educators; and the Missouri Department of Elementary and Secondary Education will improve departmental efficiency and operational effectiveness. (DESE, 2014c, p. 1)

In an effort to compete educationally with other nationally ranked states, Missouri must continue to strive toward meeting the goals and objectives. Missouri currently ranks in the middle of the 50 states in terms of educational performance; in 2017, it

ranked 26th in composite ACT test scores. The Top 10 states were Vermont, Massachusetts, Connecticut, New Jersey, Maine, Minnesota, Virginia, Montana, Wisconsin, and New York (DESE, n.d.-c). Missouri now has until 2020 to show major academic growth by way of ACT composite test scores.

Because occupations are requiring increasingly higher education for high-tech, high-skilled, and high-wage jobs, the Top 10 by 20 Plan was designed to help Missouri students be more ready for postsecondary education. A high-quality education translates into a healthier community and state, which is most apparent in employment and economic development. In 2009, the median annual income for adults without a high school diploma was approximately $24,000 whereas with a bachelor's degree it was approximately $53,000 and with a professional degree it was approximately $80,000 (DESE, n.d.-c). Economic failure and low state revenue are results of lower wage jobs and unemployment, which leads to poorly funded state programs and poor performance in public education. Improving public education could ultimately result in higher student success rates, more college graduates with higher wages, fewer people unemployed, and an all-around healthier state.

Current Standardized Assessments for Accountability Purposes

Under the NCLB Act, accountability was determined by standardized test scores. States were required to develop a system of accountability where consequences were attached for not meeting the requirements of student performance (Nichols et al., 2005). Currently, Missouri utilizes several standardized assessments to insure educational consistency and growth throughout its districts. The MAP, EOC, and the ACT are all current testing methods used throughout both elementary and secondary

schools statewide. The EOC and the ACT tests are both designed to indicate the level at which students have acquired the knowledge, skills, and competencies required upon graduation to be successful in college or a career. Each testing format is outlined below.

Missouri assessment program. As part of the 1993 school reform law, the Outstanding Schools Act required that The State Board of Education adopt academic performance standards that determined knowledge, skills, and competencies necessary for students to be successful in public elementary and secondary schools. These standards also assured adequate preparation for students for high school graduation and preparedness for college and/or a career upon said graduation. These requirements included 40 knowledge standards and 33 performance standards from the Show-Me Standards, which were what students should know and be able to do (DESE, 2009a; DESE, n.d.-i). The act also required that the State Board of Education adopt a statewide assessment system (the MAP) that measured the degree to which students met the performance standards. It tracked the performance of every school and the progress from year to year **(**Missouri Governor's Office, 1993).

One of the most recent high-stakes testing programs adopted by Missouri was the MAP; it was created and developed by DESE in order to meet the requirements of the NCLB act and was being used at the time of this study. The requirements included that states were mandated to test and report scores for 95% of the students, including ELLs and special needs students (Blank, 2011). The MAP, developed from the Show-Me Standards, determined grade-level proficiency and showed students' progress toward mastering the state educational standards, also known as the MLS (DESE, n.d.-i). These standards stated the knowledge and skills students must have in each grade level and

course in order to be college and career ready. They came about after the state decided to drop the CCSS and were aligned to the previous Show-Me Standards adopted by the state in 1996 (DESE, 2009a). The MLS defined what all Missouri high school students should know and be able to do upon graduation (DESE, n.d.-h). MAP tests are administered in the spring, beginning in the third grade and continue up until high school. From third through eighth grades, communication arts and math tests are conducted, and in fifth and eighth grades, the science test is administered as well (DESE, n.d.-i).

The MAP tests were designed to cover six subject areas addressed in the Show-Me Standards including math, communication arts, science, social studies, health and physical education, and fine arts. State-level assessments were developed for students in third and fourth grades, seventh and eighth grades, and 10th and 11th grades. The results of these exams were available for students, schools, and districts where the levels of achievement were reported as students progressed toward the state standards. The exams included multiple-choice questions, short answer or constructed response questions, and performance events. Initially, the scoring included four levels: progressing, nearing proficient, proficient, and advanced. More recently, the scores include below basic, basic, proficient, and advanced. The results are used to help teachers determine strengths and weaknesses for each student and the data as a whole was used as one of the performance measures in the state's accreditation system, the MSIP (DESE, n.d.-e). Although this test has been updated throughout the years to align with state and national curriculum revisions, it is still used today as are the scores, which are utilized as information to be included in the MSIP 5 data and APRs.

End-of-Course exams. Commencing in 2008-2009, the EOC exams (formerly known as MAP tests) replaced the MAP tests at the high school level. This change was in response to feedback received from Missouri school districts (DESE, 2016a) and was a logical extension of elementary and middle level MAP tests (DESE, 2009b). The MAP test was given at certain elementary and middle grade levels and thus measured the Grade-Level Expectations (GLEs) However, because courses like Algebra I can be taught at the middle school or at any grade level in secondary school, Course-Level Expectations (CLEs) replaced GLEs. DESE brought together teachers, administrators, parents, and business professionals to determine and develop the Show-Me Standards and Course-Level Expectation strands, as well as the assessment system that evaluates students' proficiencies of these standards and strands (DESE, 2016a). The Missouri State Board of Education identified the purposes for the Missouri EOC assessments to include measuring and reflecting students' mastery toward postsecondary readiness; identifying students' strengths and weaknesses; communicating expectations for all students; serving as the basis for state and national accountability plans; and evaluating programs (DESE, 2016a). Students receive a scale score for each attempt that ranges in value from 100-250, which is then further broken down into categories called achievement-level descriptors. These descriptors include advanced, proficient, basic, and below basic. These exams were created to meet the needs of Missouri students, teachers, schools, and districts while still complying with the state and federal requirements (DESE, 2016a).

At the start of the 2014-2015 school year, all Missouri districts were required to administer exams in Algebra I, English II, Biology I, and American Government prior to the student's graduation (DESE, n.d.-a). Currently, at least one exam is given in each

core area. Students can take up to 180 minutes to complete each test, which includes multiple choice and performance event types of questions. All public school students are required to take these exams prior to graduation, unless a student has an Individualized Educational Plan (IEP), in which case they are required to take the MAP-A test instead. The MAP-A test was established as the alternate assessment administered to students with cognitive disabilities who meet grade-level and eligibility criteria as determined by their IEP (DESE, n.d.-f). Those identified as an ELL student that has been in the United States for 12 months or less or those classified as foreign exchange students receive exemption from taking these EOC exams. Home school and private school students are also not required to take EOC exams (DESE, n.d.-a). Additional tests are available for districts to purchase to track progress in areas including English I, Algebra II, Geometry, American History, and Physical Science; however, at the time of the study they were not required by the state to be administered (DESE, n.d.-a). Because testing is costly and time intensive, it is the school district's discretion to administer the non-required exams.

The EOCs were designed to be linked with curriculum and to help students be college and career ready. AYP was determined for every school in Missouri based on the performance of student groups and overall student performances on the exam. Each group was required to meet the proficiency objective set by the state in order for the school to meet AYP (Blank, 2011). In addition to proficiency, schools were also required to meet attendance and graduation rate requirements for the purpose of preparing students for college or career. With every new initiative comes change with the intention of improving school systems so that all stakeholders are informed and all students have an equal opportunity to learn.

The SAT & ACT assessments. Included in the NCLB reformation, the ACT became an adopted assessment to measure college and career readiness for all students in their junior year. This change was implemented in 2016 and fully funded by the state of Missouri. The test was funded again in the spring of 2017, and then funding was cut by the state, forcing districts to find ways to cover the costs of the ACT test, if they still opted to use it as a viable method to track students' college and career readiness. The ACT test, however, has not always been the most prevalent examination to assess students' college readiness.

In the late 1800s, a College Entrance Examination Board was founded at Columbia University by representatives of 12 elite universities and three high school preparatory academies. The purpose of the Board was to administer annual examinations in subjects that were thought to be important for college readiness. At that time, approximately 4% of students attended college. By 1925, around 20,000 students took the College Board Exam (Atkinson & Geiser, 2009).

During World War I, psychometricians developed a test to measure mental and cognitive ability. The purpose for the test was to ensure that only the most intellectual men were chosen to be soldiers. After the war, these tests were then used to help determine who would be best suited for further education and higher employment (Schmidt, 2008). These exams were later modified and used to measure intelligence and ability. It was named the Scholastic Aptitude Test. In 1941, the College Board Exams were suspended and SAT was the standard test administered by all northeastern private colleges and universities as part of the college admissions requirements (Atkinson & Geiser, 2009). The SAT is still accepted today in colleges and universities across the

nation. In addition to being the test that measured intelligence and ability, it also became a useful tool for measuring the quality of the education provided in the United States. When SAT scores in the U.S. began to decline in the 1960s, the government intervened by passing the ESEA in 1965 (Schmidt, 2008). This act was designed to address the quality of public education, low academic proficiency when being compared to other nations, and the achievement gap that separated the affluent from the minority and low-income students.

The SAT was not the only testing option available to students who were college bound. In 1959, the ACT was founded and served as a competitor to the SAT (Atkinson & Geiser, 2009). It was used not only for college entrance, but also for placement and as an indicator of academic preparation. In the beginning the exam included four sections: English, math, social studies, and natural science.

In 1989, the Enhanced ACT was administered, which changed the exam by replacing the Natural Science section with Science Reasoning, and replaced Social Studies with Reading. Additionally, the Math section added trigonometry and the English section put more emphasis on writing than on grammar (Jacobsen, 2013). In 1996, the American College Testing Program formally changed its name to the ACT. By 2005, the ACT was the most widely used and accepted college entrance exam, and in 2007, the ACT was a valid admissions test for every 4-year college and university in the United States (ACT, Inc., 2018). It is still the most widely utilized test to prove college readiness today. In 2010, more students took the ACT than the SAT, and starting in 2014, every Missouri high school administered the ACT to junior-level students as a requirement for graduation (DESE, 2014b). By 2016, approximately 2,100,000 tests

were given, making it the leading college admissions test in the United States (ACT, Inc., 2018). These record numbers may be a result of the ACT exam being an accepted measure of college and career readiness, which allows Missouri schools to meet the MSIP 5 and ESSA requirements.

The ACT was designed to compete with the SAT for testing students to determine whether they are ready for and to what degree they will experience success in college. Both tests are accepted today by most universities and colleges and are used mainly in the acceptance and scholarship process. The ACT score, as well as high school GPA, are the two most common predictors of college success. The test has "acted as a gatekeeper to many of the country's institutions of higher education, especially in the Midwest" (Conrad-Curry, 2011, p. 28).

The ACT assessment is a 215 multiple-choice question test, which is divided into four core subject areas: English, reading, math, and science (ACT, Inc., 2018b). The students are allowed up to 2 hours and 55 minutes to complete the exam and scores range from 1 to 36 on a standard scale. A composite score is formed based on subscores from all four sections of the exam (ACT, Inc., n.d.-b). It is designed to measure what a student knows and understands from a high school level curriculum. Therefore, students who have completed more rigorous high school coursework should score higher on the exam (ACT, Inc., 2005).

Each section of the ACT is derived by utilizing the CCSS and the ACT National Curriculum Survey. The ACT National Curriculum Survey was sent to thousands of K-12 and college instructors to determine what was currently being taught and what was considered essential for students to be successful in college (ACT, Inc., 2013). The

CCSS were developed in 2009 by state governors and commissioners of education from across the United States through their membership in the National Governors Association (NGA) Center for Best Practices and the Council of Chief State School Officers (CCSSO). They recognized that all students should be graduating from high school, college and career ready, regardless of where they live (CCSS Initiative, 2018a). Today, some states are opting out of utilizing the CCSS and have been allowed to modify these standards and tests with permission from state officials.

The ACT Assessment has now become the most widely used college admissions exam in the U.S. (Jacobsen, 2013). It is one way to help determine if students are ready for college and how well they rank compared to their peers. Another way to rank students is by their GPA. Most colleges use a combination of an admissions test score, GPA, and often written essays as well. The ACT is a curriculum-based exam, which also provides students with career and educational planning information (ACT, Inc., 2018a). The test is aligned to state standards and scores are used to rank students, comparing them to one another on the basis of how well they demonstrate knowledge of high school level subject matter.

In February of 2014, the Missouri School Board voted to approve the administration of the ACT test plus writing to all Missouri junior-level students for the purpose of meeting one of the MSIP 5 performance standards: college and career readiness. The ACT is one of two most widely accepted college entrance exams used today. During the 2014-2015, 2015-2016 and 2016-2017 school years, the state of Missouri paid for all junior-level students to take the ACT exam. However, in July of 2017, Governor Eric Greitens cut more than $10,000,000 from education; these cuts

substantially affected money provided in the area of performance-based assessments. This cutback in state funding resulted in schools being solely responsible for the cost of the ACT test that all junior-level students were expected to take. Some school districts absorbed the costs and only administered the test to students who were interested in attending college after graduation while some more affluent districts (in which funding was not an issue) continued to administer the test to all junior-level students. The ACT and colleges allow students multiple attempts to achieve the highest possible score on the test so that students may fulfill their mission and achieve their full potential.

Some local southwest Missouri school districts have decided to allow students to take practice ACT exams by administering one each fall and spring, hoping for better preparation for the actual ACT exam they will take in 11th grade. This practice allows freshman students to take a practice exam five times prior to the actual ACT test in the spring of their junior year. Each practice exam is also scored in house with similar scoring to the official ACT test so as to allow students to determine the area(s) where they are struggling. Students may then focus on those areas for improvement (see Appendix B). Students receive a report with data of their specific practice test scores and ways to improve in the specific areas of math, science, English, and reading.

At the southwest Missouri high school, the department head of each core subject area (English, math, science, and social studies) is given a fall practice ACT test disaggregated data report from the Curriculum and Instruction Department showing which types of questions students struggle with most. From this report, teachers in each department collaborate on identifying the top five types of questions missed most and

how to best make improvement. In addition to this, every department focuses on either numeracy or literacy in their department improvement plans. Each quarter, the departments report how they have incorporated into their curriculum ways to improve either numeracy or literacy and statistical evidence of their efforts.

For the most recent school year, the southwest Missouri high school determined to administer the ACT test to only college-bound juniors while offering the ASVAB testing to any military-bound juniors after the state cut funding that previously covered the cost for juniors to take the ACT test each spring. During first semester of the students' junior year, they were asked their plans upon graduation: college, military, or workforce. This survey allowed the school to offer two other test options to students who would not be attending university after high school. An ACT WorkKeys test was administered to students who intended to head to the workplace upon high school graduation. By offering three different testing options, the school was able to save a considerable amount of funding as the primary ACT test is the most costly of the three tests, currently $46 per test (ACT, Inc., 2018a). The ACT WorkKeys test expense is covered from a grant and the ASVAB testing is financially supported by the military.

Most colleges and universities require an ACT or SAT exam score for college admittance for the purpose of determining the college readiness of the applicant. Many institutions also include GPA to help determine if the student is ready for higher education. The content in the ACT is aligned with Missouri's College and Career Readiness Standards and is also utilized to help predict student success in college courses (Conrad-Curry, 2011). While this test does not guarantee a student's success at the

collegiate level, it functions as an indicator of the student's readiness to attend. For this reason, universities rely heavily on its information.

Educational institutions utilize ACT assessment data in copious ways. The data establishes a baseline score for students, for academic advising and counseling, in developing curriculum and intervention strategies (ACT, Inc., n.d.-b) for evaluation studies, in accreditation documentation for college and career readiness (DESE, 2014a), and in public relations. All of these areas need objective, unbiased data that can be obtained from standardized testing.

Students are often directed to take less rigorous college classes if they have earned lower GPAs in high school and/or if their ACT score is less than desirable. Both high schools and colleges use ACT test data to show patrons how the school may rank compared to state averages, as well as to attract and recruit. Many of the "agencies that provide scholarships, loans and other types of financial assistance to students tie such assistance to students' academic qualifications, as measured by ACT scores" (ACT, Inc., 2017). This financial assistance based on test scores puts even more pressure on high school students. University scholarships for first-time college freshmen are often based on high school GPA and ACT test scores initially, but then may be renewed or lost based on the college GPA. Some colleges may even have an official or unofficial minimum ACT cutoff score for acceptance, such as Washington University in St. Louis, Missouri, whose unofficial minimum cutoff score is a 27.

Much controversy surrounds standardized testing as it relates to high-stakes decisions such as retention, graduation, and rewards to teachers and schools with money and ratings (Magee & Jones, 2012). A common concern is that educators will only teach

to the test rather than teaching students the skills necessary to process and think at a higher level. "High-stakes standardized tests are increasingly seen as a means of raising academic standards, holding educators and students accountable for meeting those standards, and boosting public confidence in schools" (Kearns, 2011, p. 113). These, too, provide reasons for increased pressure on teachers and students to perform well on state-level standardized tests.

Research has shown that with high-stakes testing comes serious problems. Those in opposition believe that using only one measurement of competence to decide whether or not a student is ready for college "violates the professional standards of the measurement community" (Nichols et al., 2005, p. 1). Others believe that with so much depending on test scores, the validity of those scores could lead to corrupt educational practices. Teachers report that the scores become more important than the needs of the student; extrinsic rewards cannot replace the background experiences that motivate and support students in their learning (Nichols et al., 2005). Regardless of teachers' views on the high-stakes tests, there must be a means for measuring student and school district achievement.

The United States spends an estimated $20,000,000,000 to $50,000,000,000 per year on testing. Some believe that these dollars may be better spent on the actual education of the students rather than on testing and have thus pulled out of the testing consortiums to develop less expensive tests (Breiner, 2015). Unfortunately, the process of developing new tests that are aligned with the curriculum can take several years and may ultimately result in a more costly outcome than expected.

Grades, Coursework, and ACT Scores

Research has been ongoing for more than 70 years regarding the validity of standardized tests. In 1966, Linn found variation in grading policies and practices in high schools resulted in high school GPAs being a poor predictor of achievement in college. The types of courses completed by students were more important than GPA as students were able to take easier courses and earn higher GPAs. This created incentives for students to avoid more difficult courses such as math and science (Johnson, 1997), which are crucial in the success of students taking and performing well on the ACT exam (Hein, Smerdon, & Sambolt, 2013). In the 2004 study by Woodruff and Ziomek, data of high school GPA and ACT scores of students who had graduated from public schools between 1991 and 2003 were analyzed; it was determined that grade inflation was present over the 13-year time span (Woodruff & Ziomek, 2004). In 2013 Zwick found that high school GPA and standardized tests both contribute to the prediction of academic performance and that they are both highly correlated.

According to Roth, Crans, Carter, Ariet, and Resnick (2000), students with average grades who complete challenging courses are better prepared for college-level work than those students who earn high GPAs by taking less rigorous courses. Woodruff and Ziomek (2004) found that students who were enrolled and completed a set of core courses (math, science, English, and social studies) in high school had a greater probability of earning higher ACT composite scores than students who did not complete the set of core courses. Allen (2015) found that achievement in high school core courses influence ACT scores. It is logical to think that an average student in a more rigorous (honors or college level) set of core courses would be more successful and score higher

on a standardized test than a student who was not challenged by taking rigorous core classes.

Because the ACT is a standardized assessment, the scores are more easily interpreted than are courses completed or grades earned (Jones, 2008). Universities can view ACT assessments as unbiased measures of students' college readiness. Grades, however, can be based on factors such as attendance and class participation, which are not representative of cognitive academic achievement (Bassiri & Schulz, 2003). Researchers have looked into the relationship between ACT test scores and GPA. Noble and McNabb (1989) determined that ACT test scores were related to course grades and that taking more math and science courses would result in higher ACT scores, regardless of the student's academic ability. Many researchers believe that grades are important, but a better combination with which to predict college success is that of grades, ACT scores, and coursework completed (Noble, 1991).

Practice

As part of the selection process for college entrance, students are expected to take and perform well on entrance exams such as the ACT. There are many high-stakes tests available to students depending on their path of study such as the Medical College Admission Test (MCAT), the Law School Admission Test (LSAT) or the Undergraduate Medicine and Health Sciences Admission Test (UMAT). According to Griffin, Harding, Wilson, and Yeomans (2008), practice on high-stakes tests such as the UMAT does improve scores. Hausknecht, Halpert, DiPaolo, and Moriarty Gerrard (2007) also found in a meta-analysis that "effects were larger when practice was accompanied by test coaching and when identical forms were used" (p. 373).

Much research has been done with regard to whether or not practice improves test scores. It is a common practice for students to retake the ACT exam in order to achieve a higher score. As far back as 1983, Lanier (1993) found in his master's thesis, *Examination of Observed Scores on the ACT Assessment,* according to internal ACT management reports, approximately 10% of ACT Assessment examinees tested at least twice between October 1983 and June 1985. This figure rose to 16% for the test dates between October 1986 and June 1988, and jumped to nearly 28% (based on slightly different criteria) for the test dates between October 1989 and June 1991. Among students who tested in the 1992-1993 academic year, the retest rate was slightly over 30% (Lanier, 1993). Lanier was not the only researcher finding these results with retesting and the ACT. In Harmston & Crouse's article, "Multiple Testers: What Do We Know About Them?" (2016), between 2009 and 2015, students who took multiple tests prior to graduation showed an increase from 41% to 45%. The data continue to show that these retesting composite scores were 2.9 points higher than those who took the test only once (Harmston & Crouse, 2016). Continuing to test allows students to become familiar with the test setup and the types of questions to be asked; thus, it allows those students to be better prepared for receiving higher scores.

One set of researchers, Kulik, Kulik and Bangert (1984), conducted a meta-analysis of 40 studies and found the following:

> Students can raise their scores by taking practice forms of the tests. The size of the gains from the practice appeared to be a function of three factors.
>
> First, gains were larger when identical forms of a test were used for practice; second, the size of the effect increased with the number of practice tests given;

and finally the size of the effect was influenced by the ability of the population studied (p. 435).

Much more research was conducted for the next 20 years and still, similar results were found. According to Clotfelter and Vigdor (2003), the reason for improved test scores was two-fold. First, students gained in increased familiarity with the test, its format, and the kinds of questions that were asked. Secondly, increased scores may be a result of an increase in knowledge, based on aging and time in school.

Some Midwest schools have recently implemented practice ACT exams for all ninth through 11th grade students. Grades 9 and 10 take a practice exam twice each year, once in the fall and once in the spring. Eleventh-grade students take a practice test in the fall and the official ACT in the spring. This system allows students in the ninth grade to take five practice tests before taking the official ACT in the spring of their junior year, thus becoming better acclimated to the format and timing of the test.

In addition, not only does retesting show an average increase to test takers, of all testers who took more than one ACT exam in 2015, 57% showed an improvement on their composite score on the second attempt. However, 22% saw their composite score decrease on the second attempt (Harmston & Crouse, 2016). These data are confirmation that more students benefit from retaking the test, and districts that offer practice tests to students numerous times throughout their educational career should show an overall increase in test scores from these studies.

Assessment and Motivation

Motivation toward achieving goals in life is essential and is a central part of any student's educational experience. Most students understand and recognize that learning is

important, but many are simply not motivated by academics or anything school related such as high-stakes tests or grades. For these students, tying the learning to personal goals is often a way for students to better understand the importance of school and performance. Many students are more successful in school by setting and reaching or progressing toward goals, while others are more successful by receiving extrinsic rewards, such as grades, praise, social recognition, money, gift cards, food, prizes, trips, or electronics. Some schools have used extrinsic rewards such as free entry into certain athletic events, dances, early dismissal to lunch, a raffle entry for prizes such as gaming systems, or even some extra credit points toward their grade in the class (Zittlosen, 2016). Conversely, some building leaders do not believe in using such incentives because if students were already motivated and the next time there were no rewards, they may not be as motivated. Extrinsic motivators with negative consequences also exist. These generally occur when students do not do their work and result in a phone call home, missed recess, or removal of free time (Zittlosen, 2016). Many feel that too much rides on one test score; it is merely a one-day snapshot of what is happening in the school, and there is much more that should be included in the accountability for schools.

Much research has been conducted on student motivation and the motivation of examinees on high- and low-stakes exams (Abdelfattah, 2010; Amrein & Berliner, 2003, Barry, Horst, Finney, Brown, & Kopp, 2010, Cole, Bergin, & Whittaker, 2008, Silm, Must, & Taht, 2013, Wise, 2009). Most often, motivated examinees perform better with higher test scores than do less motivated examinees (Wise & DeMars, 2005). Even studies in which examinees self-reported their test-taking motivation and effort found motivation and test performance positively related (Wise & DeMars, 2005). Those

unmotivated students typically give less than their full effort, resulting in test scores that underestimate their actual ability. Problems such as this may be dealt with by implementing appropriate and effective strategies. Examinee motivation may not only affect the individual student, but it may also affect the overall assessment results, the degree of instructional effectiveness, and perhaps the evaluation of the teacher and school. Some districts push assessment scores so heavily that students often believe that the only goal of learning is to excel on exams. Some districts promote intimidation and threats for low test scores as a way to increase effort (Usher & Kober, 2012).

What is at stake can often determine the amount of effort students put forth. There are low- (no consequences) and high-stakes (consequences) assessments, internal (classroom), and external (state) assessments. Depending on the type of assessment and the alignment with the student's personal interests and goals, the same student may be motivated at different levels. Some students are motivated by assessments that provide them with their academic standing, rather than what reward or punishment they may receive (Usher & Kober, 2012). This can be motivating to some as they tend to have feelings of competence and control.

The research of Hamilton, Stecher, and Yuan (2008) indicated that although student achievement has improved since 2002 on high-stakes state accountability tests, one should be cautious about the effectiveness of the testing policies and the inference that student motivation has prompted these increased scores. In general, teachers devote more classroom time to content that is likely to be tested and less time on untested material, thus increasing the possibility that students will become uninterested and less motivated (Hamilton et al., 2008; Usher & Kober, 2012). Some teachers also devote too

much time to practicing examples that are similar to the test or rearranging the content sequence based on the testing schedule. Drilling students with test preparation rather than teaching problem solving can be counterproductive and demotivating (Usher & Kober, 2012). High achievers may be motivated by high-stakes tests, but for students who are already at risk, high-stakes tests typically have a disproportionately negative effect of reduced motivation.

Some evidence shows that high-stakes tests decrease student motivation and increase the number of students who are retained, leave school early, or drop out (Amrein & Berliner, 2003). Research has shown that when rewards and sanctions are associated with performance on high-stakes tests, students are less motivated and less likely to engage in critical thinking skills. Teachers are more likely to teach to the test and less likely to allow their students to explore other learning opportunities (Amrein & Berliner, 2003).

High-stakes tests often have personal consequences for examinees, such as diplomas, grades, promotions, licensure, and others. Low motivation and effort are typically not an issue. Raising consequences for performance is likely to increase effort and motivation, but it also brings with it other concerns such as test security, validity, and student remediation procedures. More resources are often required for high-stakes, rigorous exams.

Because high-stakes tests can be so stressful, methods of learning such as mastery learning, formative assessment, and adaptive instruction model may allow students to deeply learn without feeling overwhelmed and completely stressed out. According to Zimmerman and Dibenedetto (2008) in their article, "Mastery Learning and Assessment:

Implications for Students and Teachers in an Era of High-stakes Testing," they reported the following:

> This model provides teachers with (a) timely feedback about the progress and deficiencies of students in meeting specific instructional goals, and (b) a curriculum that provides extra time and opportunities for all students to gain mastery. This instructional model was highly effective, not only in enhancing students' learning, but also with increasing their motivation. These qualities are of special importance to the long-term prospects of American students by preparing them to succeed in higher education and to enter the workforce as resourceful and self-reliant employees (p. 215).

The theory behind the idea of accountability claims that student achievement will increase with the pressure of high-stakes testing. Supporters of this practice believe that the quality of education will escalate by offering incentives and rewards as well as punishments and sanctions for students' academic performance. School districts are faced with the problem of students not being motivated to try their best on exams even when there are low consequences for them individually. Test-taking motivation is the "extent to which examinees give their best effort to the test, with the goal being to accurately represent what one knows and can do in the content area covered by the test" (Silm et al., 2013, p. 435). Tests such as the MAP or the EOC may have low student consequences, but they have high stakes for school districts in that they may encounter corrective action, restructuring, loss of funding, or a complete takeover of the school if student performance remains low (Brown, 2015). Cole et al., 2008) found that when students believe the test to be unimportant or not useful, they do not put forth their best

effort. They found that when the stakes increased for them personally, so did their effort. Additionally, they found that student performance on low-stakes testing would not be as high as it would be on high-stakes testing. Much research has been conducted discovering what would motivate students to do well on state exams.

Personal consequences pay a key role in motivation. Some researchers have found that students are more motivated and receive better results in high-stakes testing as compared to low-stakes testing where there are no consequences for poor performance (Barry et al., 2010). According to L.F. Smith and Holterman ten Hove (2009), the consequences of an exam affected the amount of effort students put forth while taking exams. They found that effort and motivation are directly related to the level of consequence for the examinee.

According to Abdelfattah (2010), national standardized exams in schools often have low stakes for the students but do have implications for administrators, teachers, and school systems. He found the reverse to be true for high-stakes tests such as the SAT or ACT where there are meaningful consequences to the students. The study investigated the extent to which test-taking motivation is related to performance in low-stakes exams. He believed that if there was little to no benefit for the examinees to do well on the exam, then their effort would be small. Abdelfattah wanted to know the extent that test-taking effort correlated with test scores. He found that low-effort students did not perform as well as high-effort students globally. Students who were more motivated scored higher (Abdelfattah, 2010). This study shows that motivation plays a crucial role in the success of high-stakes test scores. Research from both Abdelfattah and L. F. Smith and Holterman ten Hove proved that motivation plays a role in test results.

Assessments can be used as motivators if they provide useful data to students and are personally aligned to the goals of the student (Usher & Kober, 2012). For assessments to be motivating, they must provide information about the students' learning and be aligned with the students' goals. They must start with easier goals and gradually increase in difficulty, allowing students to perform well on low-stakes tests before taking an exam that counts (i.e., high-stakes tests). Students must understand the expectations of them ahead of time. Assessments that reward growth and that allow for failure to be used as a learning tool can have much stronger effects on motivation than competition or performance levels (Usher & Kober, 2012). Anderman, Anderman, Yough, and Gimbert (2010) argued that value-added models that focus on individual student progress over time using the goal orientation theory perspective have more potential to positively affect academic motivation than traditional approaches in high-stakes testing environments. Often anxiety, frustration, and fear of failure come with high-stakes assessments and can result in loss of interest and demotivation.

"Selling" the importance of assessments can also be useful in that the academic citizenship of some students will be enough to get students to try their best on the exams. By explaining to students that the results from the test will be used to improve instructional programs, students should respond more positively (Wise, 2009). Unfortunately, not all school culture is the same, and it could play a role in the willingness of students to respond positively to the request that they try their best.

In addition to there being multiple variables surrounding testing for students and teachers, there are also intended and unintended consequences of high-stakes testing for all stakeholders. The obvious intended main goal is to increase student achievement, but

other intended consequences include aligning the instruction to the standards; increasing motivation for teachers, students, and parents; reducing achievement gaps in subgroups; and increasing research and evidence-based instructional methods. The unintended consequences also occur and include narrowing the curriculum to teach only what is being tested, demoralization with testing failure, anxiety, corruption, inappropriate resource allocation, and making decisions based solely on one test score (Braden & Schroeder, 2004).

Since the passage of the NCLB, students have been required to take more tests than ever before. These tests include course formative and summative exams, district assessments, and state and national assessments. Because of so much testing, many believe that schools are creating more reluctant learners and creating a feeling that schooling is less enjoyable than ever. By putting so much weight on testing, the results are often a narrowed curriculum, losing courses in the fine arts and practical arts, and students who are uninspired and uninterested who often drop out (Nichols & Berliner, 2008). While tests and data are needed to ensure learning is occurring, it should not be at the cost of curriculum, courses, and students' success.

According to Braden and Schroeder (2004), there are some ways to help school systems make better decisions regarding testing and learning, which will also help with meeting the requirements of the NCLB Act and ESSA. These include accountability and high-stakes testing to include helping everyone involved in testing to better understand the results, using the results to plan for the following year with the goal of increasing student learning, bringing scientifically based teaching methods into the classrooms to improve student learning, and helping those with test anxiety to cope. According to Wolf

and Smith (1995), high levels of motivation help to maximize test performance, but often anxiety accompanies motivation, which can be detrimental. The best scenario is high motivation and low anxiety to achieve high levels of performance. With so much change in state-required accountability and testing, much is determined by human data. It may be a step in the right direction with the ESSA allowing testing to incorporate student achievement or growth.

Intervention Strategies to Promote Motivation and Improved Performance

New measures to increase motivation and effort are being developed and studied that may be employed to significantly reduce the effects of non-effort or to prevent it from occurring at all. The types of goals set by students and the context in which the goals are set can affect academic motivation and effort. If the goals are too difficult, then they can actually become demotivating. If they are too easy, then they will have no value. Goal setting can be used as a motivator, but the goals must have the following characteristics: they must be desirable and challenging, yet attainable; there must be a clear path for attaining the goal; goals may be tailored to the student; and mastery-based goals are preferable to performance-based goals (Usher & Kober, 2012). Goal setting can be an effective means of increasing motivation if the goals are properly established.

According to Viola Supon (2008), professor at Bloomsburg University, teachers and principals may use many strategies for increasing student success with high-stakes tests. Teachers must know the skills that the state-mandated test measures and what their students are expected to know. They must also look for ways that students can practice the test-taking experience. This practice, as well as their daily lessons, should include the content and concepts of the exam. Other strategies include aligning the curriculum to the

standards, curriculum mapping, and benchmarks. Schools that give practice ACT exams can use the subtest data in core classes to better prepare students for the actual ACT test. Familiarizing students with the vocabulary terms of the test and repeating those terms regularly through exercises is another strategy that is effective and useful. Preparing students with general information can also be beneficial, such as reminding students to have sharpened pencils, have a good meal, and get adequate rest before the exam (Supon, 2008). Most teachers learn about these types of intervention strategies in their educational programs in college and/or professional development opportunities through their district.

Some teachers feel that positive feedback or "verbal persuasion" is a useful and powerful tool to use with students as it informs them of their success and allows them to have higher feelings of self-efficacy. Practice using highlighting, study guides, and note tags can be beneficial to students, as well as letting students use released items from the old exams. Teachers that have regularly used the state standards and vocabulary from the exam in their daily lessons have also had success in preparing and motivating students. Teachers may also require their students to regularly use resources such as rulers and protractors if they will be expected to know how to use them on state exams. Some educators have had success with integrating cross-curricular activities, while others have used inspirational slogans, pep rallies, yoga, Tai Chi (for reducing test anxiety), free breakfast on the day of the test, and websites for teachers and students to gain diagnostic information (Supon, 2008). The grade level, culture, and climate of the school will all help to determine which combination of tools will work best for each school.

Because principals are viewed as instructional leaders, they often tend to view testing more positively as it provides them with teacher and student data. Some possible strategies for increasing motivation from the view of a principal include speaking to the students individually, providing test-taking tips on stickers and pencils, providing a newsletter that includes information about the test and tips, organizing tutoring for those who need extra help, displaying a "hall of fame" of student achievement, allowing upperclassmen to address underclassmen for the purpose of helping them to understand what state testing is like from a student's perspective, and employing numeracy and literacy coaches to assist teachers. Some principals have provided in-service or professional development sessions for curriculum alignment and provided a data analysis for the faculty. Others have hired retired teachers to work with at-risk students, lowered class sizes, and provided more technology (Supon, 2008). All of the teacher and principal strategies included have been known to help ease the pressures of state testing, as well as raise student success.

During this time of high-stakes testing, as an effort to improve students' achievement, much concern has come about regarding the fairness and effectiveness of standardized tests. Volante (2005) found that a student's performance could fluctuate with anxiety, so using only one high-stakes test as a measure of pass or fail may result in adverse effects. It is possible that any outside variable (e.g., a noisy environment, a personal issue, a different format of the exam, etc.) could have an impact on the test outcome. Educators are questioning the use of such tests for evaluating the effectiveness of instruction, and many resort to teaching the test rather than the curriculum. Many feel that the feedback from these tests is also not properly used to make instructional

decisions. Because of these concerns, a number of educators believe standardized tests should be abandoned (Zimmerman & Dibenedetto, 2008). However, standardized tests are one way to measure if students are ready for college and career, thus abandoning them is not an option.

Mastery learning, where students must master the material in a formative assessment before moving on to the next unit, may be one strategy to help students improve on high-stakes tests with less stress. Teachers utilize frequent formative assessments giving feedback about which students have not met the objectives or instructional goals. These students are given correctives such as workbooks, and alternative readings. The correctives focus on material that has not been mastered. Students are able to take the formative assessment three times, so that all students reach mastery before moving forward. Those students who passed the initial assessment are given enrichment material to extend the mastery learning process. This method teaches students to be more responsible for their own teaching and retesting to be more self-regulated learners (Zimmerman & Dibenedetto, 2008).

Compared to teachers and students from more traditional forms of instruction, those who have been involved in mastery learning programs report fewer negative reactions to high-stakes testing. They are more confident and more satisfied with reaching their goals. Mastery learning has shown a reduction in the levels of stress for students surrounding high-stakes summative tests as well as improving learning and motivation (Zimmerman & Dibenedetto, 2008). All of these outcomes are important for preparing students to succeed at the postsecondary level of education and when entering the workforce as career-ready employees.

According to Brown (2015), schools should ask their students what would motivate them to put forth the most effort on high-stakes tests, then repeat the question in a few years to see if the strategies being used are still as effective, or if the school may need to modify its incentive program. Some educators believe that if schools continue in the same manner, implementing federal high-stakes testing into the current curriculum, districts will risk reducing student motivation, and will increase the loss of students by dropping out and the loss of teachers by finding other employment, thus resulting in a less educated society. Many educators feel that although test scores may rise, these actions are hurting the public education system. Perhaps a better alternative to high-stakes testing is providing high-quality preschools, small class sizes, highly qualified teachers, adequate medical programs, and more formative testing programs, which will result in intellectual, fiscal, and social reforms (Wise, 2009). Incorporating these measures together with researched-based motivational strategies may result in higher test scores, regardless of whether the tests being used are of the high-stakes or formative nature.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

Introduction

For more than 50 years, testing has been a part of accountability in educational reform throughout the United States. These tests were developed and implemented to measure student learning and are used in the process of determining school funding and accreditation, as well as to determine college and career readiness. Because so much is riding on state and national exams, they have become a focus of reform. The EOC and the ACT are the two major tests that most students take in the state of Missouri. Much research has been conducted on variables such as gender, GPA, socioeconomic status, and many others that affect students' ACT scores (ACT, Inc., 2018a). However, little research has been done to determine if EOC test scores alone or combined with other variables (such as the number of advanced courses taken, the number of honors courses taken, GPA, and the number of times the student took the ACT exam) are good predictors of ACT composite scores. Both the EOC and the ACT are topic and content driven, and both are intended to measure student mastery toward postsecondary readiness. Both are based on standards (e.g., Show-Me Standards, Missouri Learning Standards, and Common Core State Standards) that describe essential items and skills students should know and possess to be college and career ready.

Purpose of the Study

This quantitative descriptive study was designed to examine what relationships, if any, existed between state and national high-stakes tests (the EOC and the ACT). Much research points to a direct relationship between retaking the ACT exam and improved

composite scores (Harmston & Crouse, 2016). The purpose of this study was two-fold. First, to determine the level of the relationship between ACT subtest scores (dependent variable) and EOC subject test scores (independent variables), as well as the level of significance between ACT composite scores (dependent variable) and EOC subject test scores combined with one or more other variables, including cumulative GPA, the number of honors courses taken, the number of advanced courses taken, and the number of times the ACT was taken (independent variables). If a positive correlation is identified in any of the combinations of the independent variables with the dependent variable, then it is possible for students and districts to benefit by using these findings to become better prepared for taking the ACT exam. It is likely that examining the same variables in other similar Missouri schools could result in an equally beneficial outcome.

The secondary purpose of the study was to determine which variables would be the best predictors of ACT composite scores. It was expected that the multiple regression analysis would result in a strong, positive relationship between comparative EOC tests (e.g., English II, Algebra I, Biology, and Government) paired with the number of honors courses taken variable, and ACT composite scores, thus consequently serving as a more accurate predictor. In this chapter, the purpose of the study, research questions, research hypotheses, details of the participants, sampling procedures, research setting and design, instrumentation, and data treatment will be given.

Research Questions

The research questions for this study included three sub questions:

1. What is the correlation between Missouri EOC subject exam scores and ACT subtest scores?

2. What other variables have a relationship with ACT composite scores?
3. What are the predictors of ACT composite scores from those who complete the EOC exams?

In an effort to answer the questions listed above, the following null hypotheses (H_0) were also tested.

1. There is no statistically significant relationship between Missouri EOC subject test scores and ACT subtest scores.
2. There is no statistically significant relationship between the variables in this study with ACT composite scores.
3. There are no statistically significant predictors of ACT composite scores from those who complete the EOC exam.

Participants of the Study

The study was conducted using junior-level students' data for the 2015-2016 and the 2016-2017 school years. During these 2 school years, every junior-level student in Missouri was required to complete the ACT exam during the school day. Currently, with the reduction of state funding, it is now the responsibility of each school district to decide whether or not every junior-level student takes the ACT test. Some school districts have decided to cover all fees, some have decided to cover fees for those pursuing college after graduation, and some districts have left it up to the student to pay to take the test during the Saturday ACT scheduled testing times. Data from the southwest Missouri high school study were used as a comparison to overall data across Missouri.

In accordance with the guidelines of Southwest Baptist University regarding the protection of human participants, a request for review was submitted to the Research

Review Board (RRB) for approval to survey/interview/collect data. After receiving RRB approval, data collection and analysis began. No student names were used in this study as they were unnecessary for data comparison purposes. Ethical considerations and precautions were made to ensure no risks were created for participants from whom the data were collected. Anonymity and confidentiality were also taken into consideration to protect participants from whom the research data were collected.

Sampling Procedures

In compliance with the Southwest Baptist University guidelines regarding the protection of human participants, the researcher submitted a request for review to the RRB for approval. The request for review inquired approval to use two sets of data; one from the Department of Elementary and Secondary Education's Comprehensive Data System to gather average ACT data from all schools in the state of Missouri for the purpose of making a comparison to data collected from the specific southwest Missouri high school, and the other from the southwest Missouri high school's SISK12 Data System for gathering data on all the school's junior-level students. All data from the juniors in the southwest Missouri high school's graduating classes of 2017 and 2018 were used, for a total of 634 participants. These students were selected as all students in the junior-level were tested during the 2015-2016 and the 2016-2017 school years. Using all of the juniors from this school allowed for a more adequate representation of all subgroups. Students missing any data were thrown out of the data pool.

Research Setting

Average ACT composite score data from a southwest Missouri high school was compared to average ACT composite score data from 518 schools across Missouri. This

initial comparison was done to suggest that the southwest Missouri high school's sampling may be representative of the Missouri population of juniors and that the results may not be only for students attending the southwest Missouri school, but rather for all students in the state of Missouri. All participants in this study were from a specific high school in southwest Missouri. Demographic information including cumulative GPA, the number of advanced courses taken, the number of honors courses taken, and the number of times the ACT was taken were used in this study. All of these variables were included to aid the researcher in analyzing the data. The southwest Missouri high school was built approximately 10 years ago. It was located in a suburban community with approximately 1,400 students and has a 37% free and reduced lunch rate.

Research Design

Initially, the average ACT subtests and composite scores from the southwest Missouri high school were compared to the average ACT subtests and composite scores from 518 schools across the state of Missouri. The ACT subtest, composite scores and the EOC are continuous variables with interval scale measures. A simple single-sample *t* test was used to compare each data set and each ACT subtest along with the ACT composite was tested for significant differences with an alpha level of .05 ($a = .05$). Finding a nonsignificant result would illustrate that data collected from the southwest Missouri school were equivalent to Missouri data, thus generalizing this school to the state of Missouri. The average data were collected electronically from the DESE Missouri Comprehensive Data System (DESE, n.d.-g).

After the southwest Missouri school was generalized to the whole of the state, the individual student data from the southwest Missouri school was collected from the

SISK12 data system, then downloaded into a Microsoft Office Excel spreadsheet and analyzed with the SPSS statistical software program. A Pearson's *r* test was used to answer the first research question (What is the correlation between Missouri EOC subject exam scores and ACT subtest scores?). Each one of the EOC test scores (English II, American Government, Algebra I, and Biology) we compared to the corresponding ACT subtest scores (English, Reading, Math, and Science). This was done to determine if the EOC subject scores alone are correlated to the ACT subtest scores.

A Pearson's *r* test was also used to answer the second research question (What other variables have a relationship with ACT composite scores?). The EOC subject test scores combined with various combinations of other variables, (cumulative GPA, the number of honors courses taken, the number of advanced courses taken, and the number of times the ACT was taken), were compared to ACT composite scores to determine which combination resulted in the highest correlation coefficient. The independent variables were the EOC exam scores, cumulative GPA, the number of honors courses taken, the number of advanced courses taken, and the number of times the ACT was taken; the dependent variable was the ACT composite score. The GPA, number of honors courses taken, number of advanced courses taken, and the number of times the ACT test was taken are all continuous variables with interval scale measures.

A multiple regression test was used to answer the third research question (What are the predictors of ACT composite scores from those who complete the EOC exam?). This was done to determine if the EOC combined with the other variables could be used as predictors of ACT composite scores. The independent variables were the EOC subject tests and the academic and test-taking behaviors (cumulative GPA, the number of honors

courses taken, the number of advanced courses taken, and the number of times the ACT was taken) whereas the dependent variable was the ACT composite score. The multiple regression analysis was used to determine the strongest correlation and therefore the greater predictive power between the independent variables and the dependent variable.

The approach of the study was that of a quantitative analysis due to the fact that the data collected were numerical and statistical. Quantitative research refers to the collection and analysis of numerical data used to describe, explain, or predict occurrences that can be measured and generalized across similar populations (Gay, Mills, & Airasian, 2009). The researcher employed the significance level of .05 to examine any effects of the independent variables on the dependent variables.

The research methodology used to answer the research questions in the study included a Pearson's *r* to determine the correlational relationships between the variables, and a multiple regression test to determine the strength of the predictability of each variable (EOC test scores, cumulative GPA, the number of honors courses taken, the number of advanced courses taken, or the number of times the ACT was taken) on ACT composite scores. Because there were correlational relationships found with the variables in the southwest Missouri school study, then it is likely that examining the same variables in other similar Missouri schools could result in an equally beneficial outcome.

Instrumentation

The data collected for the research were obtained from the Student Information System K-12 database of the southwest Missouri school and from DESE's Comprehensive Data System. SISK12 is a software system that manages student data. It includes demographic information, transportation, student activities, grades, transcripts,

teacher gradebooks, and much more. Some data are hand entered by a variety of people in different departments during each year of the student's schooling. For example, transportation enters busing information, teachers enter grades, counseling enters transcript information, athletics enters activities and citizenship violations, principals enter discipline, and so on. Some data are imported directly from teacher gradebooks into progress reports and transcripts. Student names are not necessary to pair data variables and will not be used in this study. All data collected were downloaded directly into a Microsoft Office Excel spreadsheet. All data from the Excel spreadsheet were then downloaded into the SPSS software program and were used to run the Pearson's *r* correlational statistical tests.

Data Treatment

The data from a southwest Missouri school were obtained by running two reports from the Student Information System using SISK12 and then downloading it directly into a separate Microsoft Office Excel spreadsheet. Reports were run from the 2015-2016 school year and from the 2016-2017 school year. These 2 years were used because it was during this time that the most recent, up-to-date tests were administered and all junior-level students in the state of Missouri were required to take the ACT exam. Only junior-level student data were used in the study. The data obtained included EOC test scores for each subject area (English II, Algebra I, Biology, and Government), ACT subtest scores (English, math, science, and reading), ACT composite scores, GPAs, the number of honors courses taken, the number of advanced courses taken, and how many times the student took the ACT test. All variables were used in different combinations to

determine which ones combined with EOC test scores had the greatest impact on ACT subtest scores and therefore on overall ACT composite test scores.

This research sought to determine if EOC scores were accurate predictors of ACT subtest scores. To determine this, the researcher investigated whether or not there was a positive correlational relationship between ACT subtest scores and EOC test scores, GPA, the number of honors courses taken, the number of advanced courses taken, or the number of times the ACT was taken. The analysis of the data used a matched-pair correlation as well as a multiple regression analysis to determine what relationships existed between the EOC and the ACT, and which of the variables paired with the EOC contributed to the prediction of better ACT scores.

This study will use a *t* test which has assumptions met for the dependent variable of ACT scores; that the use of interval or ratio data is met; where independent observations will be obtained from the sample, and the scores are assumed to be normally distributed. Any outliers will be detected and analyzed as to their possible impact on the results obtained. This study will also utilize Pearson's *r* for the purposes of correlating the variables selected in this study. These variables are also of interval or ratio level and are assumed to be normally distributed, but as key to a relationship study, meet the assumption of a linear relationship between them. The use of scatterplots will occur to check for this linearity. Also, any outliers detected will be analyzed for their possible impact and it will be addressed in chapter four as to how they were handled. Multiple regression is also used in this study, and there are similar assumptions made for this statistical method as found with correlations, but multicollinearity among variables will

be analyzed for in that inspection, it can be better determined if any highly correlated variables violate the assumption and lessen the predictive power of the regression model.

Summary

Data was collected on students who took both the ACT test and the EOC exams. It was determined that a collection of scores from the ACT were representative of EOC subjects being tested for school and district results. The research was to determine if the performance on EOC subtests and perhaps combined with other variables typically seen in high school settings (honors courses, advanced courses, number of times the ACT was taken, etc.) could contribute to the prediction of ACT scores. Because the data were collected and available from the southwest Missouri school's Student Information System, no interview or survey instrumentation was necessary.

The information gained from the results will be used to improve student ACT exam scores in Missouri schools. The results will be shared with local districts for the purpose of encouraging students to take the highest or most rigorous course offered in each content area, to take the ACT multiple times, and to implement mastery learning and motivation strategies into the current curriculum. It is the desire of the researcher to help students improve ACT scores, thus improving student learning and their chances for college acceptance and scholarship opportunities, all while maintaining funding, ensuring accreditation, and improving the overall outlook of the stakeholders on the public school system.

Chapter Three focused on details of this study's methodology. The details included information regarding the purpose of the research, research questions and hypotheses, selection and sampling procedures of the participants, research setting and

design, validity and reliability of the instruments used in data collection, and data treatment. The researcher also described the data analysis procedure. In Chapter four, the researcher will present the findings through the data from the study. Further implications and impacts of variables that affect ACT scores will be detailed in Chapter Five. Chapter Five will also summarize conclusions from data analysis, as well as provide recommendations for future study in the area of state and federal level standardized test data comparison.

CHAPTER FOUR

ANALYSIS OF THE DATA.

Introduction

As a result of schools falling short of the mark set by state and national governmental standards, educational reform has been ongoing since the Elementary and Secondary Schools Act of 1965 (DESE, 2012a; Hunt Keen Leadership Fellows, 2016, Missouri Governor's Office, 1993: U.S. Department of Education, 2010, 2018). Part of this reform has included and currently includes mandated testing. The two most widely used tests in Missouri during the 2015-2016 and the 2016-2017 school years were the EOC and the ACT. Currently, little data exists regarding the relationships between these tests and whether or not the EOC can be a good predictor of ACT test scores. During this era of high-stakes tests, having a way to predict scores could be beneficial to students, teachers, schools, and districts.

The primary purpose of this qualitative study was to help schools and students improve their high-stakes test scores by determining what relationships, if any, exist between state and national high-stakes tests (the Missouri EOC and the ACT). The secondary purpose of this study was to determine what other variables have a relationship with ACT composite scores and whether or not the EOC alone or combined with these other variables are good predictors of ACT composite scores. Knowing the relationships between the variables and their predictive values could have a positive impact on Missouri schools and perhaps lead to future studies.

The researcher detailed the procedures for conducting the study in Chapter three, which included the participants and the selection process. The researcher also described the research setting, design, and data treatment. The final data collected were uploaded into an SPSS software program for analysis. Descriptive statistics were utilized to present quantitative data in a simple and measurable way. Chapter four was used to organize and present collected data. Data will be presented in this chapter to generalize the southwest Missouri school to the rest of the schools in the state of Missouri, to give insight into the relationships between EOC subject tests and ACT subtest scores, to determine the relationships between other variables and ACT composite scores, and what the predictability is of ACT composite scores from EOC test scores and other academic and test taking variables. The following research questions were addressed:

1. What is the correlation between Missouri EOC subject exam scores and ACT subtest scores?
2. What other variables have a relationship with ACT composite scores?
3. What are the predictors of ACT composite scores from those who complete the EOC exams?

In an effort to answer the questions listed above, the following null hypotheses (H_0) were also tested.

1. There is no statistically significant relationship between Missouri EOC subject test scores and ACT subtest scores.
2. There is no statistically significant relationship between the variables in this study with ACT composite scores.
3. There are no statistically significant predictor of ACT composite scores from

those who complete the EOC exam.

For the purpose of this study, the researcher chose to eliminate any student data that was not complete (i.e., missing any score from the list of demographic variables).

Study Design

This study essentially contained four parts. The four parts included the initial comparison of the average ACT scores between a southwest Missouri school and the average ACT scores from 518 Missouri schools, and three research questions. The initial comparison was for the purpose of generalizing the southwest Missouri school to the state of Missouri. The three research questions sought to answer if the EOC state subject tests have a relationship with national ACT subtests, and if the EOC subject tests combined with other academic and behavior variables have a relationship with and can be good predictors of ACT composite scores.

Comparing the Sample Data to the Population

The researcher first wanted to determine if the data from the subjects of the southwest Missouri school were representative of the entire population of Missouri students. The average ACT subtests and composite test scores were collected from a southwest Missouri school using the DESE Comprehensive Data System. This data was compared to the average ACT subtest and composite data (also from the DESE Comprehensive Data System) from schools across Missouri using 5 simple single-sample *t*-tests. The assumptions of the *t* test were met in that the scores were of interval scale measures and were linear. They were of normal distribution with significance values of less than 1.0 (Table 1). The sample size was adequate and the variances of the measures were equal (homogeneity of variance). The ACT in general produces a normal

distribution of scores, and the large sample size meets the homogeneity of variance assumption as seen by analyzing the standard deviation of the sample scores compared to the state scores.

The English ACT subtest average score for all 518 Missouri schools was compared to the English ACT subtest average for the southwest Missouri school. The science ACT subtest average score for all 518 Missouri schools was compared to the science ACT subtest average for the southwest Missouri school. The reading ACT subtest average score for all 518 Missouri schools was compared to the reading ACT subtest average for the southwest Missouri school. The math ACT subtest average score for all 518 Missouri schools was compared to the math ACT subtest average for the southwest Missouri school. Lastly, the average data for the ACT composite for all 518 Missouri schools was compared to the composite ACT average for the southwest Missouri school. The southwest Missouri school consisted of 317subjects in the 2015-16 school year, and 316 subjects in the 2016-17 school year for a total of 633 subjects for the study.

For each comparison, a single sample *t*-test was conducted (Table 1). Scores above the conventional .05 level of significance would be considered significant and therefore not generalizable. In this analysis four of the five *t*-tests reported as not significant. The math *t*-test score was significant and thus any findings would be viewed with caution.

The mean score for the Missouri English ACT subtest compared to the southwest Missouri school ACT English subtest test was $M = 19.49$, with a standard deviation of 5.841. A *t*-test was conducted to compare the sample mean to the population mean and

the result for the ACT English subtest was t = -.880, df = 619, p = .379. The mean for the Missouri reading ACT subtest compared to the southwest Missouri school's reading ACT subtest was M = 20.7, with a standard deviation of 5.816. A t-test was conducted to compare the sample mean to the population mean and` the result for the reading subtest was t = 1.744, df = 619, p = .659. The mean for the Missouri science ACT subtest compared to the southwest Missouri school's ACT subtest test was M = 20.42, with a standard deviation of 5.073. A t-test was conducted to compare the sample mean to the population mean and the result for the science subtest was t = 1.379, df = 619, p = .937. The mean for the Missouri composite ACT score compared to the southwest Missouri school's ACT composite score was M = 20.39, with a standard deviation of 4.920. A t-test was conducted to compare the sample mean to the population mean and the result for the composite subtest was t = .947, df = 619, p = .344. The mean for the Missouri math ACT subtest compared to the southwest Missouri school's math ACT subtest was M = 20.47, with a standard deviation of 5.066. A t-test was conducted to compare the sample mean to the population mean and the result for the math subtest was t = 3.306, df = 619, p = .001. Math was the only ACT subtest score that was reported as significant (Table 1). With the exception of the math subtest, a nonsignificant result was found for all other t-tests, which illustrated that data collected from the southwest Missouri school were not statistically different from the data obtained for the population of Missouri students. Therefore, the subjects from this southwest Missouri school were deemed to be representative of the population under study. However, because the math subtest results were found to be significant, any ACT math discussion must be done with a conservative approach.

Table 1

ACT Scores From a Southwest Missouri School Compared to Those of Missouri

ACT test	*M*	*SD*	*n*	*t*	*df*	Sig (2-tailed)	*M* difference
English	19.49	5.841	620	-0.880	619	0.379	-0.206
Math	20.47	5.066	620	3.306	619	0.001*	0.673
Science	20.42	5.073	620	0.079	619	0.937	0.016
Reading	20.70	5.816	620	0.442	619	0.659	0.103
Composite	20.39	4.920	620	0.947	619	0.344	0.187

* Statistically significant at the 0.05 level.

Relationship Between EOC Subject Tests and ACT Subtests

The first research question was addressed by entering the student data collected electronically from the southwest Missouri school's SIS into SPSS for the purpose of determining the relationship between the individual EOC scores and the ACT subtest scores by the use of a Pearson's *r* correlation test. The English II EOC test was correlated to the English ACT subtest, the Biology EOC test was correlated to the science ACT subtest, the American Government EOC was correlated to the reading ACT subtest, and the Algebra I EOC test was correlated to the math ACT subtest. Correlation was significant at the 0.01 level ($p = .01$). Results closer to .7 indicated a high level of significance and a strong correlation between the variables. Correlation and regression were used as all assumptions were met. All scores were of interval scale, linear, and of normal distribution. The scatterplot (Appendix C) illustrates the linear relationship of the data.

The correlations found between all the EOC subject tests and the ACT subtest scores were all relatively strong (above .6), if not stronger. The correlation coefficient for the relationship between the EOC English II test and the ACT English subtest was r = .631. The correlation coefficient for the relationship between the EOC Algebra I test and the ACT math subtest was r = .765. The correlation coefficient for the relationship between the EOC Biology test and the ACT science subtest was r = .674. The correlation coefficient for the relationship between the EOC American Government test and the ACT reading subtest was r = .699 (Table 2). For the purposes of this study a conservative approach must be taken with further interpretive analysis for math test.

Table 2

Relationship Between EOC Subject Test and ACT Subtest Scores

EOC subject test to ACT subtest	Pearson's *r*
EOC English II to ACT English	.631**
EOC Algebra I to ACT Math	.765**
EOC Biology to ACT Science	.674**
EOC American Government to ACT Reading	.699**

** Correlation is significant at the 0.01 level (2-tailed).

Relationships Between EOC Subject Tests and Academic and Test-Taking Behavior Variables and ACT Composite Scores

The second research question was addressed by analyzing the relationship between the EOC subject test scores, and academic and test-taking behavior variables (number of advanced courses taken, number of honors courses taken, cumulative GPA, and the number of times the ACT test was taken) to individual ACT composite scores

(from the same southwest Missouri high school). A Pearson's *r* correlation test was conducted to determine what relationships, if any, existed. Correlation was significant at the 0.01 level ($p = .01$). Results closer to .7 indicated a high level of significance and a strong correlation between the variables. Correlation and regression were used as all assumptions were met. All scores were of interval scale, linear, and of normal distribution. The scatterplot (Appendix D) illustrates the linear relationship of the data.

The relationship between the EOC English II subtest and the ACT composite score was $r = .706$. The relationship between the EOC Algebra I subtest and the ACT composite score was $r = .737$. The relationship between the EOC Biology subtest and the ACT composite score was $r = .755$. The relationship between the American Government subtest and the ACT composite score was $r = .737$ (Table 3).

The relationship between the number of honors courses taken variable and the ACT composite score was $r = .719$. The relationship between the number of advanced courses taken variable and the ACT composite score was $r = .723$. The relationship between the number of times the ACT was taken variable and the ACT composite score was $r = .481$. The relationship between the cumulative GPA variable and the ACT composite score was $r = .720$ (Table 3).

Table 3

Relationship Between EOC Subject Test Scores, and Academic and Test-Taking Behavior Variable and ACT Composite Scores

EOC subject test or academic/test-taking behavior variable	ACT composite Pearson's *r*
EOC English II	.706**
EOC Algebra I	.737**
EOC Biology	.755**
EOC American Government	.737**
Number of Honors Courses Taken	.719**
Number of Advanced Courses Taken	.723**
Number of Times the ACT was Taken	.481**
Cumulative GPA	.720**

** Correlation is significant at the 0.01 level (2-tailed).

Predictors of ACT Composite Scores from EOC Subject Tests and Other Academic and Test-Taking Variables

To answer Research Question 3, multiple regression tests were conducted to determine which EOC subject tests (English II, Algebra I, Biology, and American Government) or academic and test-taking behavior variables (times the ACT test was taken, cumulative GPA, number of honors courses taken, and number of advanced courses taken) were the best predictors of ACT composite scores. It was hypothesized that certain combinations of these variables (rather than only test comparisons alone) might lead to higher predictive power and therefore higher ACT composite scores.

The significance (Sig) scores in Table 4 indicated whether or not the individual predictor variables contributed to the model. It was apparent that all variables (with the exception of the number of honors courses taken and the number of advanced courses taken) significantly contributed to the model as predictors as their Sig values were less than .05 (EOC English: $p = .001$; EOC math: $p < .001$; EOC science: $p < .001$; EOC social studies: $p < .001$; Times ACT taken: $p < .001$; Cumulative GPA: $p = 009$; Number of honors courses taken: $p = .241$; Number of advanced courses taken: $p = .144$). Correlation and regression were used as all assumptions were met. All data were of the interval and ratio level. The variables demonstrated a linear relationship (as illustrated in the scatterplots), and were of normal distribution with little to no multicollinearity, as seen in the variance inflation (VIF) factor in Table 4. Scores below a 5.0 would add to the prediction model. All VIF scores for the independent variables were below 5.0 with the exception of the number of advanced courses taken (*VIF* = 15.787) and the number of honors courses taken (*VIF* = 15.891). Such high values would suggest these two variables do not contribute much to the prediction of ACT scores for high school students.

The unstandardized beta coefficients for the study indicated the relationships between the outcome and the predictor variables. Since all predictor values were positive, so were the relationships. As scores increased on any of the predictor variables, ACT composite scores also increased. The unstandardized beta coefficients also indicated the influence each predictor had on the outcome if the effects of the other variables were held constant.

A multiple regression was carried out to investigate whether the EOC English II subject test, the EOC Algebra I subject test, the EOC Biology subject test, the EOC American Government test, the number of times the ACT was taken, cumulative GPA, the number of honors courses taken, and the number of advanced courses taken could significantly predict participants' ACT composite scores. The EOC English II subject test contributed significantly to the model ($\beta = .055$, $p < .05$), as did EOC Algebra I ($\beta = .027$, $p < .05$), EOC science ($\beta = .051$, $p < .05$), EOC American Government ($\beta = .053$, $p < .05$), number of times the ACT was taken ($\beta = .464$, $p < .05$), and cumulative GPA ($\beta = .56$, $p < .05$). The number of honors courses taken did not contribute significantly to the model ($\beta = .121$, $p = .241$), nor did the number of advanced courses taken ($\beta = .181$, $p = .144$). The overall statistical model indicated the predictive value of the outcome variable based on the predictor variables. The final predictive model was this:

ACT composite score = -22.42 + (.055 * EOC English II) + (.027 * EOC Algebra I) + (.051 * EOC Biology) + (.053 * EOC American Government) + (.464 * times ACT taken) + (.560 * cumulative GPA) + (.121 * number of honors courses taken) + (.181 * number of advanced courses taken; see Table 4).

Table 4

Contribution Levels of EOC Subject Tests, Academic and Test-Taking Behavior Variables and ACT Composite Scores

EOC subject test or variable	β	*SE*	Beta	Sig	VIF
(Constant)	-22.42	1.954			
EOC English II	.055	.011	.159	.000*	2.278
EOC Algebra I	.027	.008	.118	.001*	2.612
EOC Biology	.051	.010	.184	.000*	2.958
EOC American Government	.053	.008	.226	.000*	2.499
Number of Advanced Courses Taken	.181	.123	.125	.144	15.787
Number of Honors Courses Taken	.121	.103	.100	.241	15.891
Number of Times the ACT Was Taken	.464	.094	.126	.000*	1.414
Cumulative GPA	.560	.212	.093	.009*	2.709

Note. Dependent variable = ACT composite score.
* Significance value is less than .05.

The adjusted R^2 score indicated how strong the model of prediction was on ACT composite scores and what percent of the prediction was accounted for by the predictors. It is generally reported as a percentage, and the better the model, the higher the R^2 value. Models typically vary by discipline, but above 70% is considered a good model for prediction. The predictors in this study included all four EOC subject tests (English II, Algebra I, Biology, and American Government) and the academic and test-taking variables (number of honors courses taken, the number of advanced courses taken, the number of times the ACT test was taken, and cumulative GPA). The adjusted R^2 score for predicting the ACT composite score using all eight variables was .790 (Table 5).

Table 5

Strength of Prediction Model for Accurately Predicting ACT Subtest Scores

Predictors	*R*	R^2	Adjusted R^2	*SE* of the Estimate
All variables	0.891	0.794	0.790	2.085

Note. Variables include: EOC English II, EOC Algebra I, EOC Biology, EOC American Government, Number of Honors Courses Taken, Number of Advanced Courses Taken, Cumulative GPA, Number of Times the ACT Was Taken.

The results of the regression further indicated that the overall model, which included all four EOC subject tests (English II, Algebra I, Biology, and American Government) and the academic and test-taking behavior variables (number of honors courses taken, number of advanced courses taken, number of times the ACT was taken, and cumulative GPA) explained 79% of the variance (Table 5) and that the model was a significant predictor of ACT composite scores, $F(8,448) = 215$, $p < .001$ (Table 6). As the significance value was less than $p = .05$, the regression model significantly predicted ACT composite scores.

Table 6

Prediction Strength

Model	Sum of squares	*df*	Mean square	*F*	Sig
Regression	7502.960	8	937.870	215.744	0.000
Residual	1947.517	448	4.347		
Total	9450.477	456			

Note: Dependent variable: ACT composite. Predictors: (Constant), EOC English, EOC science, EOC math, EOC social studies, Number of times the ACT was taken, cumulative GPA, Number of honors courses taken, Number of advanced courses taken.

The results of Research Question 3 indicated that there was significant predictive power between the EOC subject test scores and ACT composite scores. The results also showed that there was significant predictive power between ACT composite scores and the student's cumulative GPA and the number of times the ACT test was taken. Ultimately, the highest predictive power was that of the EOC subject tests combined with cumulative GPA and the number of times the ACT test was taken on the ACT composite score. Beta was the value used for the prediction model; the significance score told the level of significance that the variables had on the predictability and the R^2 score indicated that percent of the predictability was from the variables. Therefore, in the overall model for prediction, six of the eight variables contributed significantly, with the number of courses taken, that were either honors or advanced courses, that did not significantly contribute to the prediction of the ACT scores.

Now that a predictive power has been established, students, teachers, and administrators can use this information to better understand that the EOC and ACT tests assess similar material. With this information, educators may use EOC subject tests to

help students become better prepared for the ACT subtests. As students improve their ACT subtest scores, their overall ACT composite scores also improve.

Summary

The purpose of this study was to better understand the correlation between the EOC subject test scores and the ACT subtest scores, as well as to know what other variables (number of times the ACT was taken, cumulative GPA, number of honors courses taken, and number of advanced courses taken) have a predictability effect on ACT composite scores. Overall, there were statistically significant findings in this study as well as findings that were not statistically significant.

Regarding Research Question 1, the results were statistically significant when comparing the southwest Missouri school's EOC exam scores to the southwest Missouri school's ACT subject test scores (EOC English II to ACT English, EOC Algebra I to ACT math, EOC Biology to ACT science, and EOC American Government to ACT reading), meaning there is a strong correlation between the EOC subject test scores and the ACT subtest scores. However, because the initial ACT math subtest could not be generalized to the state, it is possible that the significance of the Algebra I EOC scores and math ACT subtest scores would only apply to the southwest Missouri school and not to the schools in the rest of the state.

Regarding Research Question 2, the results were statistically significant when determining the relationship between the ACT composite scores and the variables of the EOC English II, EOC Algebra I, EOC Biology, EOC American Government, the number of honors courses taken, the number of advanced courses taken, the number of times the ACT was taken, and the cumulative GPA. However, because the ACT math subtest

could not originally be generalized to the state of Missouri, the math results may only be for the southwest Missouri school and not applicable to other schools in the state.

Regarding Research Question 3, ultimately, the best combination of variables to result in the highest predictive power of ACT composite scores was that of the EOC subject tests combined with cumulative GPA and the number of times the ACT test was taken. However, because the ACT math subtest could not be generalized to the state ACT math subtest scores, it is possible that the math beta, significance, and R^2 scores would only apply to the southwest Missouri school and not to the schools in the rest of the state.

Chapter four presented the analysis of the data. Chapter five includes implications and impacts of variables that affect ACT scores. Chapter Five also summarizes conclusions from data analysis, as well as provides recommendations for future study in the area of state and federal level standardized test data comparison.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The purpose for this study was to help schools and students across the state of Missouri improve their high-stakes test scores. This study sought to look at test comparisons and course-taking patterns as a function of the testing environment in Missouri. Discovering that there is a correlation between EOC subject tests and ACT subtests could help students be aware of their academically weak areas so that they may better prepare for the ACT exam. There is a great deal of overlap in testing environments throughout schools, such as courses taken, GPA, the number of times students can take the ACT, and state-required EOC tests. The researcher aimed to determine which variables were correlated and which ones had greater predictive value on ACT scores. Knowing this information would help Missouri educators, students, and parents decide which strategies might be the most effective toward improving ACT test scores.

Research was conducted using the Missouri state EOC subject tests and the nationally recognized ACT subtests and composite scores and comparing those scores to those of a sample of students from a southwest Missouri high school. This quantitative study was conducted to also determine what other variables had an effect on the ACT composite scores, and to what degree those variables alone and combined could predict ACT composite scores. In this chapter, a summary of the methods will be presented, as well as the limitations, general conclusions, implications, and recommendations for further research.

Summary of Methods

Initially, average ACT subtest and composite score data were collected for all junior students in the 2015-2016 and the 2016-2017 school years from a southwest Missouri high school using DESE's comprehensive data system. These data were compared to the average ACT subtest and composite score data from all 518 schools across the state of Missouri. Using *t*-tests to analyze the data, the researcher found that there was no significant difference with the exception of the math subtests. This result allowed for the generalization of the southwest Missouri school scores to the scores from the rest of Missouri and the conclusion that the southwest Missouri population of students was a good representative sample of schools across the entire state.

Individual EOC subject test data and ACT subtest data were collected from a southwest Missouri high school using SIS. Using a Pearson's *r* test, each test was compared in order to determine the correlation between them (i.e., EOC English II subject test was compared to the ACT English subtest, etc.). The study then explored the relationship of other variables (number of times the ACT test was taken, cumulative GPA, number of honors courses taken, and number of advanced courses taken) to the ACT composite scores using a Pearson's *r* test. Lastly, using the same data, a multiple regression test was used to determine the predictive values of EOC subject tests and other variables on ACT composite scores.

Conclusions

The findings from this study indicate that the sample suburban school in southwest Missouri represented the population under study fairly well. Rural and urban schools may consider conducting similar research to determine if the same comparisons

would have the same outcome. The research questions were designed to guide the research in an attempt to help educators, students, and parents gain a better understanding of how the Missouri EOC can help prepare students for taking the ACT test.

The Pearson's *r* test results for Research Question 1 (What is the correlation between Missouri EOC subject exam scores and ACT subtest scores?) suggest there is a significant correlation between Missouri students' EOC subject test scores and the ACT subtest test scores. This implies that there was significant overlap in what was being tested in each EOC subject test and in ACT subtests. This also implies that the curriculum being taught in core EOC testing classes is sufficient and beneficial to students who were taking the ACT tests. The correlation found between EOC and ACT tests may also assist with motivating students to take the EOC courses and tests seriously so as to be better prepared for the ACT test. Students who perhaps did not score well on a particular EOC subject test may then know to concentrate more heavily in preparing for the ACT test in that same subject area.

The Pearson's *r* test results for Research Question 2 (What other variables have a relationship with ACT composite scores?) suggest that there is a significant correlation between all four EOC subject tests, the academic and test-taking behaviors of cumulative GPA and the number of times the ACT test was taken, and the ACT composite test scores. There is also a relationship, though not quite as strong, between the number of advanced courses taken and the number of honors courses taken with ACT composite scores. These results suggest that students who are academically focused and conscientious about their cumulative grade point average and improving their ACT score by taking the test more than once see the benefit of their hard work resulting in a higher

ACT composite score. It implies that there is great benefit to students who are following the pathway of taking core classes aligned to their grade level (i.e., English I, physical science, Algebra I, during their freshman year; English II, Biology, Geometry, during their sophomore year, etc.) so that they would take the EOC test and use the EOC score information to better prepare for future ACT tests. It would also help them so as to not fall behind on content or opportunities to take the ACT test.

The regression model used to answer Research Question 3 (What are the predictors of ACT composite scores from those who complete the EOC exams?) produced results that suggest all four of the EOC subject tests, combined with all the academic and test-taking behaviors of cumulative GPA and how many times the ACT test was taken, number of honors courses taken, and the number of advanced courses taken (the predictors), have a strong predictive value on ACT composite scores. The model indicated that 79% of the prediction was accounted for by these predictors. Because predictive power has been established by this study, students can use the information gained by their EOC test results to better prepare for the ACT test. This may also help students gain or maintain motivation to take more advanced coursework, maintain a higher GPA, and take the ACT test multiple times to ultimately perform well on the ACT test. The predictive power may also assist educators in advising students what courses to take to help prepare them for the ACT test. Parents may also benefit from this study by routinely encouraging their students to remain challenged, supporting their student's learning, and continuing to hold them accountable for their efforts.

Limitations

The limitations to this study included only 2 years' worth of data as those were the 2 most recent years that the state of Missouri required students to take the ACT test. The scope of the study was also limited to the southwest Missouri region, however the initial statistical analysis was done to generalize the data from the southwest Missouri high school to the rest of the state of Missouri. Unfortunately, the ACT subtest scores in math were significantly different between the state average and the sample group, thus, data for math would be difficult to generalize. Additionally, any correlation or predictive value the EOC in math may have for the ACT score should be viewed with caution.

Implications

Students, teachers, counselors, and principals wanting to improve high-stakes test scores can use the results of this study to improve test scores and to conduct further research. If in fact the southwest Missouri school is not only a representative of other southwest Missouri schools, but also representative of all Missouri schools as the initial *t* tests indicated, then the results from this study may be used to improve test scores across the entire state.

This research study shows that EOC subject tests and ACT subtests are strongly correlated. With these results teachers should use the state standards to ensure their curriculum covers all content that is tested in the EOC and in the ACT. Teachers may also consider incorporating released EOC and ACT test items in their daily lessons to help students become acclimated to higher order thinking questions.

Because the results of this study also show that advanced and honors courses are good predictors of ACT test scores, school counselors can use the results to determine the

best order for courses to be taken that would support higher learning as well as a stronger cumulative GPA for students to be better prepared to take and do well on these high-stakes tests. The results also show that the number of times the ACT was taken is a strong predictor of ACT scores. School leaders can encourage and help plan for students to take the ACT test more than once as the data show that students do better on the test when they have taken it more than once.

According to the Item Response Theory, as items are indeed generated for like areas of testing the scores would be expected to be similar, or at least correlated. They cover similar subject matter, they use the multiple choice format, and in assessing a knowledge based content the correct answer is limited to one option. This study supports the Item Response Theory as used in the ACT and EOC academic tests of knowledge.

Recommendations for Future Research

A meta-analysis including additional data from various schools across Missouri (including rural, urban, and suburban schools) may help educators across the state in knowing how the state tests (EOC and ACT) correlate and what other variables are good predictors of ACT scores. Based on these findings, the researcher recommends future research to include a wider span of all types and sizes of schools in Missouri (rural, urban, and suburban). It is possible that the results may indicate that it is not just a southwest Missouri trend, but perhaps a trend in schools all across Missouri. It might also be beneficial to research the reasons behind the math *t* test being significant and therefore not generalizable to the state of Missouri.

Additional studies may be done to determine what other variables are at work affecting the outcome of high-stakes tests, such as gender or free and reduced lunch

status. Future research might also include how schools align courses for students to receive a differentiated course of study with the intention of students being challenged and accountable, resulting in better ACT scores. Additional research may also include how students use their EOC subject test results to predict their readiness for the ACT exam, making the EOC test more relevant. It is possible that if students understand the predictability of EOC subject tests on the ACT subtests and composite scores, there may also be an increase in student motivation for them to put forth their best effort in more rigorous courses. Lastly, more research may be done including the number of times the ACT was taken and in what grade level the first attempt was made.

Although these individual research possibilities may prove to be beneficial, collectively there would be much greater expansion of knowledge and relevancy to teachers, students, counselors, principals, parents, and all stakeholders. So often EOC test scores are looked upon by some as a mere snapshot of what students know on a given day. However, often the public and other stakeholders use state exam scores to judge the district as a whole. Although the EOC is summative in nature, it may be used as a formative assessment for schools and departments to identify strengths and weaknesses of student cohorts, which might help guide reteaching and ACT focus efforts. Knowing that the EOC test and the ACT test are correlated, and having the ability to actually use EOC scores combined with other variables to help students become better prepared for performing well on ACT tests could very well be a springboard into the newest area of inquiry.

Summary

This study showed that EOC subject test scores and ACT subtest scores are strongly correlated. The results also showed that there are strong correlations between EOC tests combined with cumulative GPA and the number of times the ACT was taken on ACT composite scores. Even more powerful than the correlations is the predictive power shown in this study by the EOC test scores and the academic and test-taking behavior variables. It is extremely encouraging to think that other schools may follow the same process to determine the variables that will help their students improve their ACT test scores. Ultimately, schools can work diligently to collect and analyze in-house data to determine the variables for predicting better test scores. This would allow educators to facilitate a more conducive environment for students, setting them up for high levels of learning as well as higher test scores.

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Appendix A

Federal Educational Policy Mandates Under NCLB, Waivers and ESSA

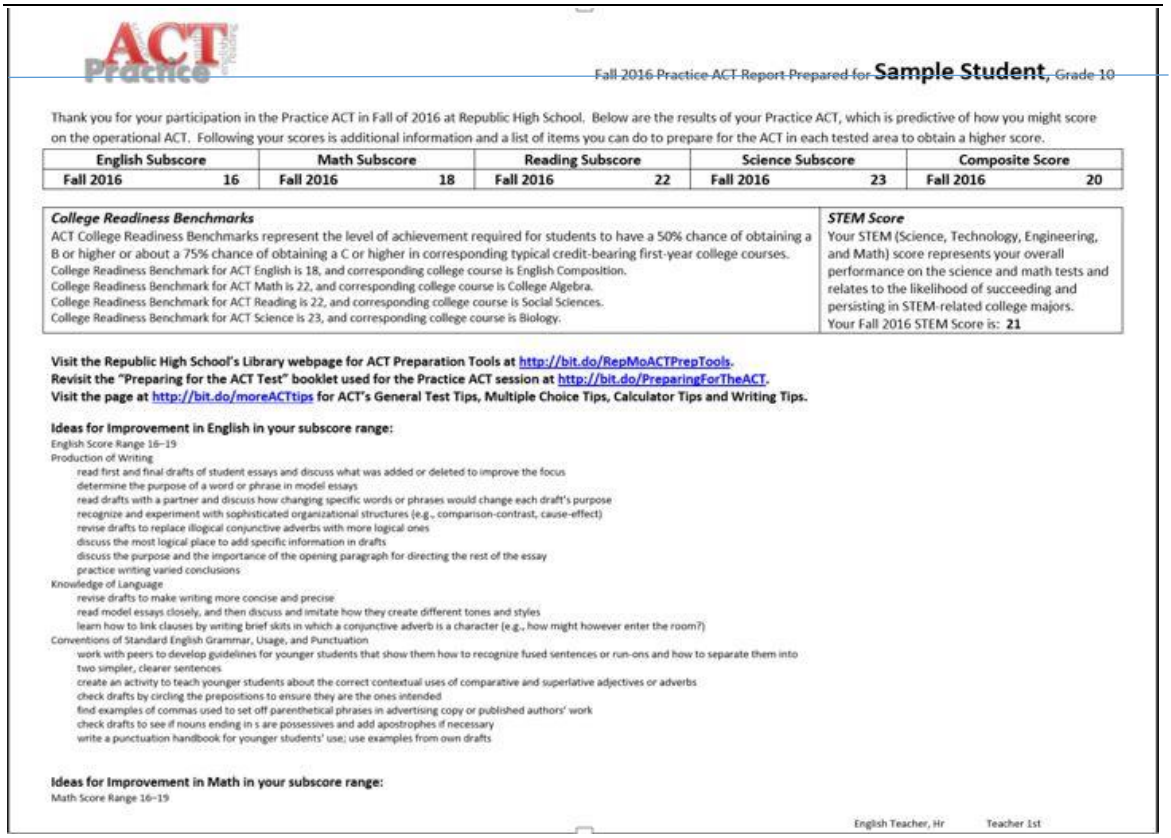
Federal education policy mandates under NCLB, waivers and ESSA

NCLB 2002-2011	Waivers 2011-2017	ESSA 2017
Testing gr. 3-8, high school	Testing gr. 3-8, high school	Testing gr. 3-8, high school
Subgroup reporting	Subgroup reporting	Subgroup reporting
95% participation	95% participation	95% participation
Adequate Yearly Progress	Adequate Yearly Progress	Adequate Yearly Progress
100% proficiency target	100% proficiency target	100% proficiency target
Sanctions	Sanctions	Sanctions
Highly Qualified Teacher provision	Highly Qualified Teacher provision	Highly Qualified Teacher provision
Intervene in failing schools	Intervene in failing schools	Intervene in failing schools
	New standards	New standards
	New tests	New tests
	Teacher evaluations	Teacher evaluations
	Principal evaluations	Principal evaluations
	State data systems	State data systems
	Encourage charters	Encourage charters

Grey elements are replaced by waivers or ESSA.

Appendix B

ACT Practice Test Results Example



ACT Practice

Fall 2016 Practice ACT Report Prepared for **Sample Student**, Grade 10

Thank you for your participation in the Practice ACT in Fall of 2016 at Republic High School. Below are the results of your Practice ACT, which is predictive of how you might score on the operational ACT. Following your scores is additional information and a list of items you can do to prepare for the ACT in each tested area to obtain a higher score.

English Subscore		Math Subscore		Reading Subscore		Science Subscore		Composite Score	
Fall 2016	16	Fall 2016	18	Fall 2016	22	Fall 2016	23	Fall 2016	20

College Readiness Benchmarks

ACT College Readiness Benchmarks represent the level of achievement required for students to have a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in corresponding typical credit-bearing first-year college courses.
College Readiness Benchmark for ACT English is 18, and corresponding college course is English Composition.
College Readiness Benchmark for ACT Math is 22, and corresponding college course is College Algebra.
College Readiness Benchmark for ACT Reading is 22, and corresponding college course is Social Sciences.
College Readiness Benchmark for ACT Science is 23, and corresponding college course is Biology.

STEM Score

Your STEM (Science, Technology, Engineering, and Math) score represents your overall performance on the science and math tests and relates to the likelihood of succeeding and persisting in STEM-related college majors.
Your Fall 2016 STEM Score is: **21**

Visit the Republic High School's Library webpage for ACT Preparation Tools at http://bit.do/RepMoACTPrepTools.
Revisit the "Preparing for the ACT Test" booklet used for the Practice ACT session at http://bit.do/PreparingForTheACT.
Visit the page at http://bit.do/moreACTtips for ACT's General Test Tips, Multiple Choice Tips, Calculator Tips and Writing Tips.

Ideas for Improvement in English in your subscore range:

English Score Range 16–19
Production of Writing
- read first and final drafts of student essays and discuss what was added or deleted to improve the focus
- determine the purpose of a word or phrase in model essays
- read drafts with a partner and discuss how changing specific words or phrases would change each draft's purpose
- recognize and experiment with sophisticated organizational structures (e.g., comparison-contrast, cause-effect)
- revise drafts to replace illogical conjunctive adverbs with more logical ones
- discuss the most logical place to add specific information in drafts
- discuss the purpose and the importance of the opening paragraph for directing the rest of the essay
- practice writing varied conclusions

Knowledge of Language
- revise drafts to make writing more concise and precise
- read model essays closely, and then discuss and imitate how they create different tones and styles
- learn how to link clauses by writing brief skits in which a conjunctive adverb is a character (e.g., how might however enter the room?)

Conventions of Standard English Grammar, Usage, and Punctuation
- work with peers to develop guidelines for younger students that show them how to recognize fused sentences or run-ons and how to separate them into two simpler, clearer sentences
- create an activity to teach younger students about the correct contextual uses of comparative and superlative adjectives or adverbs
- check drafts by circling the prepositions to ensure they are the ones intended
- find examples of commas used to set off parenthetical phrases in advertising copy or published authors' work
- check drafts to see if nouns ending in s are possessives and add apostrophes if necessary
- write a punctuation handbook for younger students' use; use examples from own drafts

Ideas for Improvement in Math in your subscore range:

Math Score Range 16–19

English Teacher, Hr Teacher 1st

Number and Quantity
- apply elementary number concepts, including identifying patterns pictorially and numerically (e.g., triangular numbers, arithmetic and geometric sequences), ordering integers, and identifying factors of whole numbers
- recognize, identify, and apply basic properties of real numbers (e.g., commutative, associative, identities)
- describe the distance between zero and a point on the number line
- measure and describe, with appropriate units, the distance between two points
- arrange data into meaningful arrays
- identify the dimensions of a matrix

Algebra and Functions
- solve routine mathematical problems that involve rates, proportions, and percents
- model real-world and mathematical problems that contain verbal and symbolic representations of money
- do multistep computations with rational numbers
- generate expressions using combinations of symbols and numbers
- describe real-world and mathematical problems associated with incremental change by using rate and/or slope language (e.g., feet per second, dollars per hour, change in y over change in x)

Algebra
- evaluate algebraic expressions and solve simple equations, using integers
- multiply two simple monomials
- apply the distributive property to multiply a simple monomial by a binomial

Functions
- recognize functions as mappings of an independent variable into a dependent variable
- distinguish between domain and range
- use function notation to create equations that model real-world and mathematical problems
- evaluate polynomial functions that use function notation

Geometry
- describe angles and triangles using mathematical terminology, and apply their properties
- use angle relationships (e.g., complementary, adjacent, vertical) to find measures of unknown angles
- sketch and identify the midpoint of a line segment
- find area and perimeter of triangles and rectangles by substituting given values into standard geometric formulas
- describe movement in the coordinate plane using positive and negative values

Statistics and Probability
- read and interpret data and use appropriate measures of central tendency to find unknown values
- gather, organize, display, and analyze data in a variety of ways for use in problem solving
- use a variety of strategies (e.g., fundamental counting principle) to determine possible outcomes for simple events
- conduct simple probability experiments, and represent results using different displays (e.g., tree diagrams, organized lists)

Ideas for Improvement in Reading in your subscore range:

Reading Score Range 20–23

Key Ideas and Details
- distinguish between what is most and least important in increasingly challenging texts
- determine how an inference might change based on the inclusion of additional information
- check inferences against information provided in a text, identifying what is and is not sufficiently supported by the text
- analyze specific parts of increasingly challenging texts, drawing accurate conclusions
- distinguish between key concepts and subordinate ideas in a text and write a concise summary about one of the key concepts
- analyze the sequence of events in written or nonprint sources
- map sequences of events in texts or films or from everyday occurrences, explaining one's thinking
- evaluate the extent to which comparisons made by the author or narrator help clarify specific relationships in the text
- search for clues embedded in a text that suggest cause-effect relationships
- examine events in written or nonprint sources to determine the primary cause(s) and final outcome(s)

Craft and Structure
- investigate the effect(s) of specific words and phrases on the reader's perceptions and behavior

- research words and phrases from different sources, identifying their shades of meaning in various contexts or situations
- interpret sentences presented in an increasingly challenging text, determining the contribution of each to the author's or narrator's intended message
- determine the role of specific paragraphs (e.g., introductory, transitional, serial) in increasingly challenging texts
- explain why an author may use one or more organizational patterns
- analyze the relationship between an author's or narrator's intended message and the rhetorical devices used to convey that message (e.g., repetition, exaggeration, understatement)
- search for clues that suggest the viewpoint from which a challenging literary narrative is written or told and determine whether that point of view is reliable or biased

Integration of Knowledge and Ideas
- defend or challenge the author's or narrator's assertions by locating several key pieces of information in a text
- synthesize information from multiple informational texts to clarify understanding of important concepts and ideas

Ideas for Improvement in Science in your subscore range:

Science Score Range 20–23

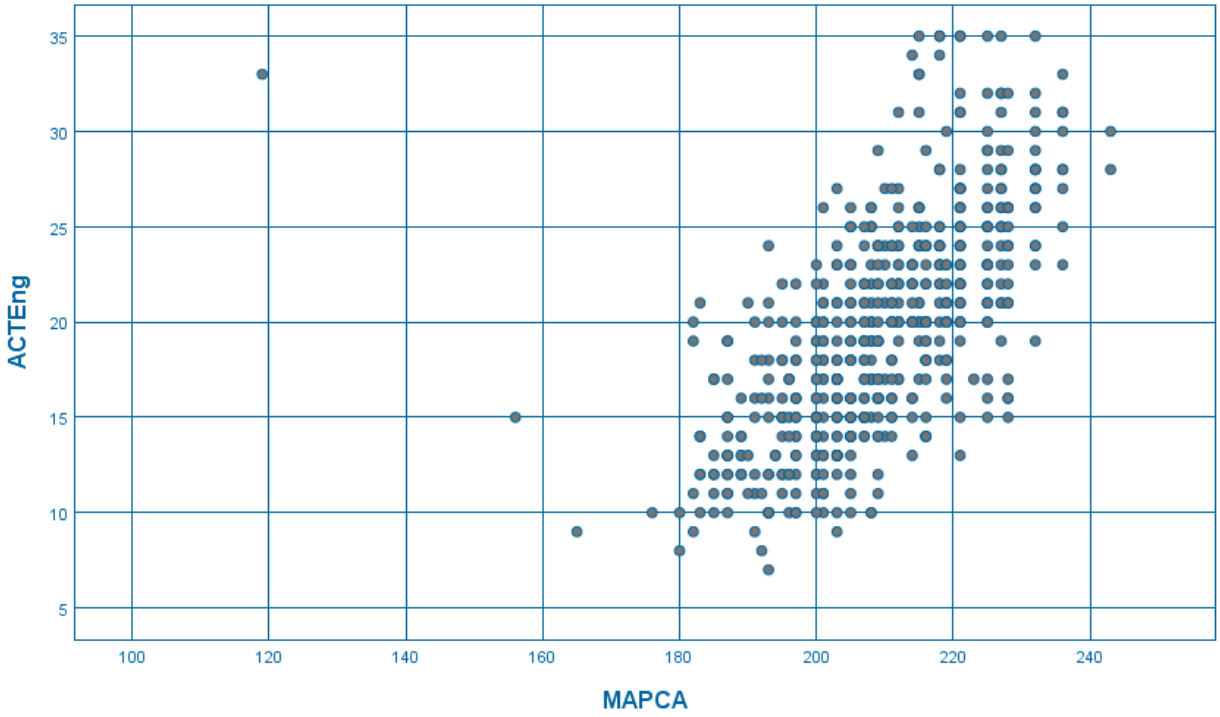
Interpretation of Data
- become familiar with scatterplots
- identify and compare scales used in different data presentations
- study a simple data set to determine how one variable is related mathematically to another variable
- explain why a particular data presentation is most appropriate to use for a specific data set
- examine line graphs to determine if they show a direct or inverse relationship between variables
- use information from popular sources (e.g., newspapers, magazines, the Internet) to enhance understanding of similar information found in science textbooks
- create a set of guidelines to help peers learn how to combine results from different experiments into one data presentation
- read a science article, and describe how the values of variables are related and how one changes in relation to the other
- compare raw data from the same experiment, or from different experiments, to determine how many and what types of data representation are needed

Scientific Investigations
- perform several repetitions of an experiment to determine the reliability of the results
- predict potential findings of new experimental trials based on past experimental trials
- describe how experimental methods accomplish the goal of answering the question driving the experiment
- describe how an experimental design could be manipulated to answer a new question

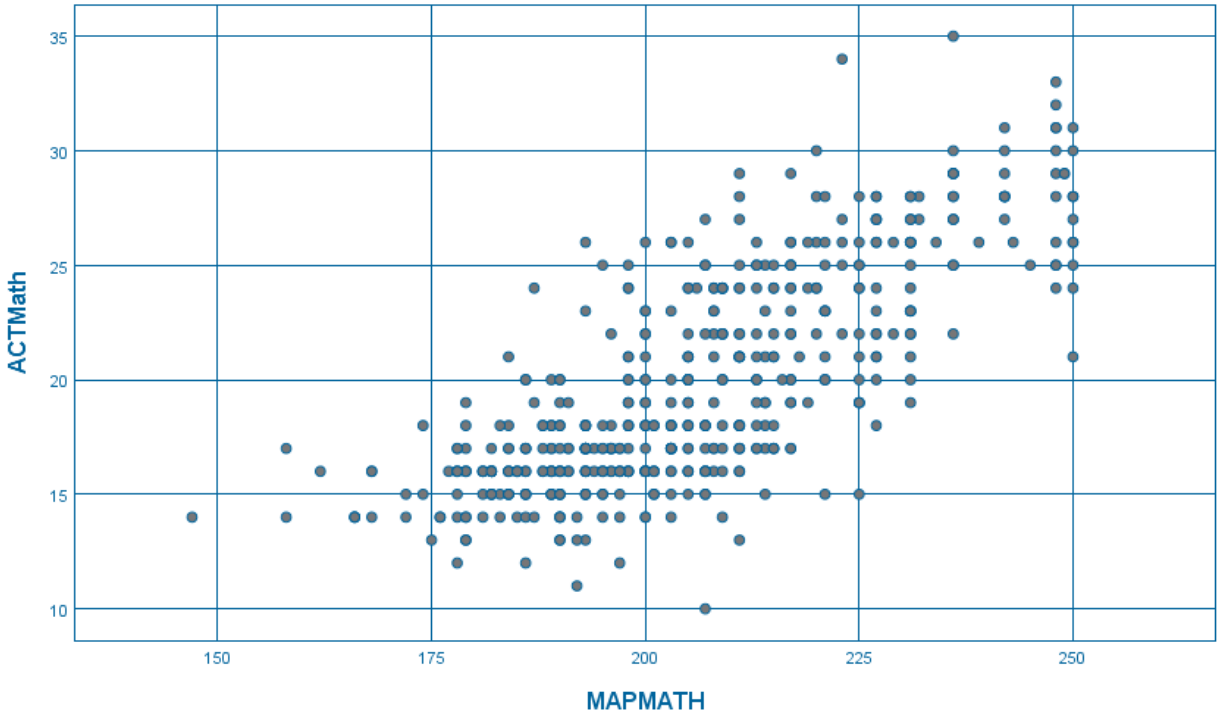
Evaluation of Models
- evaluate whether the data produced by an experiment adequately support a given conclusion
- examine data collected in a new experiment to evaluate whether it supports or contradicts a conclusion from a previous experiment
- determine the parameters or limits of how known models can be applied to specific situations (e.g., the model of Newtonian physics cannot be applied to subatomic particles, climate models are modified when new data becomes available)
- create a visual representation that shows the similarities and differences between two competing models proposed to explain the same scientific phenomenon
- engage in class discussions to critique the strengths and weaknesses of other groups' experimental findings
- determine how new findings impact predictions previously made with a model

Appendix C

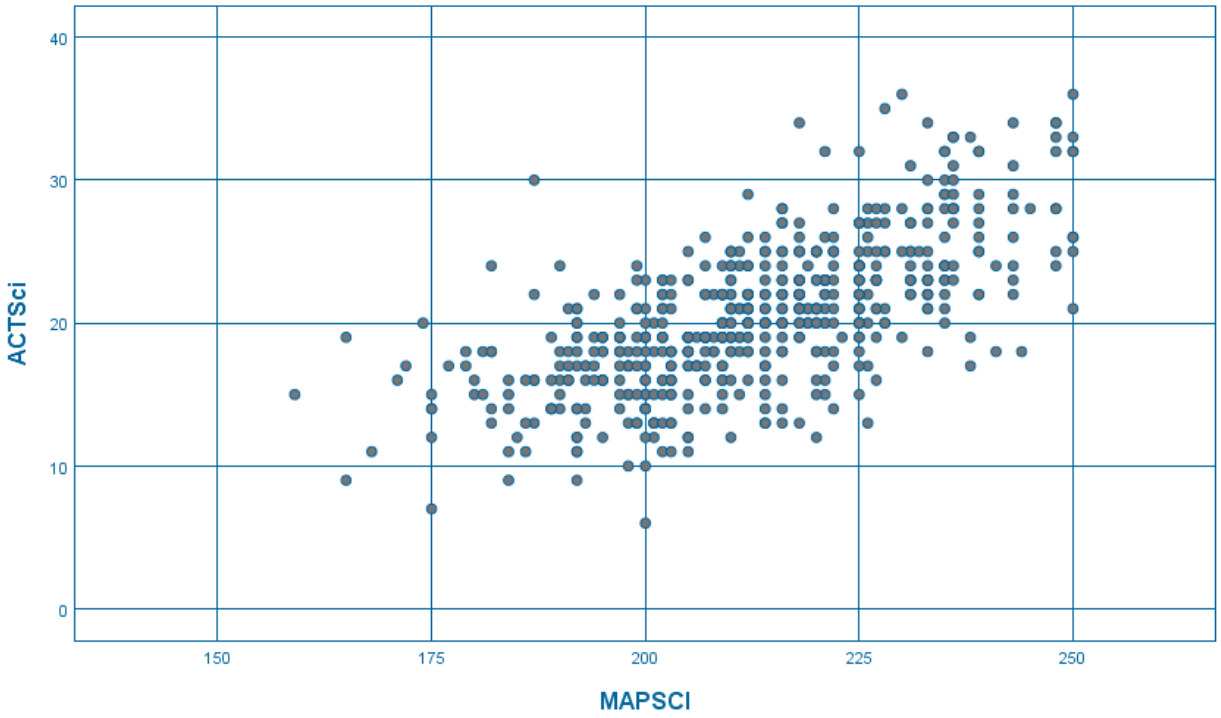
Scatterplot of ACT English vs EOC English II



Scatterplot of ACT Math vs EOC Algebra I



Scatterplot of ACT Science vs EOC Biology I



Scatterplot of ACT Reading vs EOC American Government