Dissertations

7-2012

Factors that May have Predictive Effects on the American College Test

Beth Stewart
Harding University

Follow this and additional works at: https://scholarworks.harding.edu/hu-etd

Part of the Educational Assessment, Evaluation, and Research Commons, and the Educational Leadership Commons

FACTORS THAT MAY HAVE PREDICTIVE EFFECTS

ON THE AMERICAN COLLEGE TEST

by

Beth Stewart

Dissertation

Submitted to the Faculty of

Harding University

Cannon-Clary College of Education

in Partial Fulfillment of the Requirements for

the Degree of

Doctor of Education

in

Educational Leadership P-20

July 2012

FACTORS THAT MAY HAVE PREDICTIVE EFFECTS

ON THE AMERICAN COLLEGE TEST

by

Beth Stewart
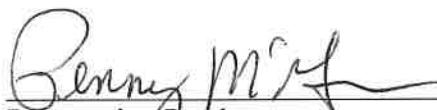
Dissertation

Diana Julian

Dissertation Advisor

5-1-12

Date

Clara Carroll

Dissertation Reader

5-1-12

Date

Benny M'T

Dissertation Reader

5-1-12

Date

Kevin "Tony" Th
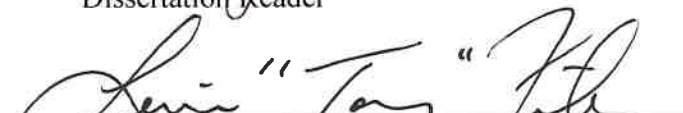
Dean of the Cannon-Clary College of Education

5/2/12

Date

Chris Pierson Yell

Assistant Provost for Graduate Programs

5/2/12

Date

ACKNOWLEDGMENTS

Many special people contributed to the completion of this dissertation. My husband, Jon, provided encouragement and support throughout my educational pursuits and gave me the strength I needed to finish. Additionally, my parents provided the confidence that allowed me to follow this dream to the end. My three boys, Nathan, Drew, and Jake, reminded me to be an example of a lifelong learner and pushed me to continue to improve myself. Lee Brannon was essential in assisting with the statistical analysis of chapters three and four. Finally, without the support of my dear friend and confidant, Megan Witonski, I would not have pursued this degree. She is one of the few that truly understands this struggle. She has been beside me through every step of the process; I could never fully express my gratitude.

The Harding University staff has been unbelievably supportive. My advisor, Dr. Diana Julian, has been essential in the completion of this dissertation. She has provided guidance, has given numerous reviews, and has offered suggestions that have helped to speed along each chapter. In addition, the guidance provided by Dr. Michael Brooks has been the vital to my success. My readers, Dr. Penny McGlawn and Dr. Clara Carroll, have provided countless hours reading each chapter in order to make it the best possible.

DEDICATION

I dedicate this dissertation to my father, Dr. Jim Hardage. I follow and am inspired by his example as an educational leader. He is one reason I am finishing this degree. His constant striving for his desired goals allowed me to achieve mine.

ABSTRACT

by
Beth Stewart
Harding University
July 2012

Title: Factors that May have Predictive Effects on the American College Test (Under the direction of Dr. Diana Julian)

The purpose of this study was to determine if any predictive effects exist between lunch status, grade point average, Arkansas state mandated accountability exams, and academic achievement measured by the ACT. Although literature supported the predictive effects of grade point average and lunch status on ACT, there was inadequate data to determine which predictor played a more significant role.

A quantitative, regression strategy was used to analyze students' academic achievement in four southwest Arkansas schools, all belonging to the same educational cooperative. All students in these districts who had taken the ACT during the school years of 2006-2010 and took the Arkansas accountability exams from September of 2006 to May of 2010 comprised the participants for this study. The population for this study included 1,696 students that took the ACT, 4,919 students' that took state mandated assessments, and 5,867 students' that had student data records.

Lunch Status, Arkansas End of Course Algebra I scores, Arkansas End of Course Geometry scores, Arkansas End of Course Biology scores, Arkansas Eighth Grade Benchmark Exam, Arkansas End of Level Literacy scores, and overall grade point

average served as predictor or independent variables. Academic achievement was measured by the ACT composite, ACT mathematics, and ACT science test results. Although the overall model was statistically significant, student lunch status was the least significant predictor, and grade point average had one of the strongest variable correlations. All state mandated testing that were examined in this study showed a highly predictive effect on ACT.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Federal legislation entitled No Child Left Behind Act of 2001 (NCLB, 2002) was enacted to "close the achievement gap with accountability, flexibility, and choice so that no child is left behind" (United States Department of Education, 2010b, p. 1). This legislation spotlighted student assessment scores and the effectiveness of school districts to achieve student scores guidelines making it vital for teachers, parents, and students to become increasingly aware of how student assessment scores could influence decisions in their district (United States Department of Education, 2007). Decisions on school choice, for example, make it necessary for schools to look for new ways to motivate students to perform at the proficient or advanced levels on high stakes assessments. Some states even provide financial incentives to students for performing well on state mandated tests (Bishop, 2004). In the same vein, colleges and universities provide scholarship monies for students who score within a designated range on the widely accepted American College Test (ACT).

Because tests like the ACT are influential in determining college entrance, educators work continually and adequately prepare high school students for college and the workforce. Numerous studies have been conducted regarding factors that may influence ACT assessment scores with the most extensive being completed by ACT (ACT, 2008a). These studies compared not only ACT scores with high school and

college grade point averages but also with grade inflation and courses taken in high school. Currently, ACT has not compared their assessment to the accountability assessments given under NCLB (2002).

Although public school students are required to score at the advanced or proficient level on the end of course and benchmark exams in Arkansas or face remediation, remediation for the ACT is much more significant for college bound students. National reports, such as Getting Past Go, indicate that although obtaining an accurate figure for the total cost of college remediation is challenging, some estimates indicate that roughly $2 billion is spent on college level remediation (Fulton, 2010). In Arkansas from the 1997-1998 to the 2007-2008 school years, total expenditures for remediation increased from $33 million to $65.7 million. Even with the remediation services, however, these students also do not fare as well in their college academic experience as their peers who meet the designated college readiness score with grade point averages and college persistence (ACT, 2007).

In the 2008-2009 academic year, enrollment for public higher education institutions indicated that 51.3% or 20,468 students were required to attend remedial courses (Arkansas Department of Higher Education, 2009). The report also indicated that remediation was provided at a rate of 26.9% in reading, 30.6% in English, and 42.5% in math. These statistics seemed to predict a bleak future for Arkansas. However, it is important to note that the Southern Regional Education Board (2010) reported, "The state's college enrollment rate of recent high school graduates increased by 8 points since 1998" (p. 45). This increase occurred just after the Arkansas Higher Education Coordinating Board (2009) reported that college remediation rates were decreasing at a

rate of 1.5 percentage points from fall 2007 and had been steadily declining over the past 10 years. Achieve (2005), a nonpartisan group concerned with preparing young adults for college and work, released a study that contained a poll that asked college professors if high school students were ready for college. The study authors reported that, "[o]nly 18% of college professors feel that most of their students come to college extremely or very well prepared, with just 3% saying extremely well" (p. 7).

Statement of Problem

Three purposes exist for this study. First, the purpose of this study was to determine the predictive effects of lunch status, Arkansas End of Course Algebra I score, Arkansas End of Course Geometry score, Arkansas End of Level Literacy score, and overall grade point average on math achievement measured by 12th grade ACT math scores for students in an educational cooperative in southwest Arkansas. Second, the purpose of this study was to determine the predictive effects of lunch status, Arkansas End of Course Biology score, overall grade point average, and End of Level Literacy score on science achievement measured by 12th grade ACT science scores for students in an educational cooperative in southwest Arkansas. Third, the purpose of this study was to determine the predictive effects of lunch status on overall achievement measured by 12th grade ACT composite score for students in an educational cooperative in southwest Arkansas.

Background

According to Bishop (2004), "these high-stakes exams are very different from the multiple-choice aptitude tests" (p. 62). Bishop pointed out that ACT and SAT are very similar in function. "Each subject exam is three hours long or more, and students write

essays or solve multistep problems, showing their work" (p. 62). In the case of high stakes assessments, schools that have certain percentages of students who do not perform at an acceptable level face radical consequences such as receiving cuts in funding, loss of students, bad publicity, and possible school closure. The Arkansas Comprehensive Testing Assessment and Accountability Program, the umbrella under which all high stakes assessments fall, uses a criterion-referenced exam as a requirement of NCLB. The accountability piece of the Arkansas Comprehensive Testing Assessment and Accountability Program includes end of course (EOC) and benchmark exams that requires students to score advanced or proficient or be placed in a remediation class (Arkansas Department of Education, 2007). The EOC exams represent the culmination of extensive planning and discussion by Arkansas educators, policymakers, and school patrons. The authority to implement this assessment was firmly established in legislation by Act 999 of 1999. All Arkansas EOC tests make up a comprehensive system that focuses on high academic standards, professional development, student assessment, and accountability for schools. Arkansas Comprehensive Testing Assessment and Accountability Program examinations were developed by Arkansas teachers and the Arkansas Department of Education and included items aligned to Arkansas Curriculum Framework (Arkansas Department of Education, 2008). Student scores on both the benchmark and EOC exams were divided into four predetermined assessment score ranges. The Arkansas Department of Education (2010f) determined these categories to be advanced, proficient, basic and below basic. Advanced students were able to demonstrate superior knowledge and skill well above grade level. Students scoring in the proficient range demonstrate firm academic performance and are ready for promotion to

the next grade or subject level. Students scoring at the basic level are able to demonstrate considerable skills but only demonstrate the partial ability to apply them. Students scoring at the below basic level are considered to lack mastery of content that has been determined necessary for their grade level.

Bishop (2004) suggested that school districts have become more aware of the limited amount of time within the school day and the increased demand on student performance. With the amount of allotted instructional time and the amount of the curriculum that must be covered and mastered by students, some districts question the feasibility of students taking two exams that assess for similar student achievement. This study examined the possible predictive effects that may influence student achievement on ACT scores.

NCLB is a reauthorization of the Elementary and Secondary Education Act of 1965 (McKim, 2007). NCLB, according to the United States Department of Education (2004, 2011), was "built on four principles: accountability for results, more choices for parents, greater local control and flexibility, and an emphasis on doing what works based on scientific research" (p. 1). Within the study, this researcher focused primarily on accountability. Each state within the United States was required to submit an accountability plan for approval from the United States Department of Education. In February of 2003, all 50 states, the District of Columbia, and Porto Rico submitted these plans for review and approval (United States Department of Education, 2007).

Today's Students

Peterson (2003) stated American life has undergone some drastic change for the better in the past two decades. On average, an environment that is a more learning-

friendly, family atmosphere surrounds today's students. In this environment, parents are

more educated, and Peterson gave some additional statistics to support his statement:

> [T]the share of the population over age 25 with a high-school diploma or
>
> its equivalent has risen to 83%, up from 52% in 1970. A quarter of adults
>
> now holds college degrees, compared with just 11% in 1970. Children
>
> also spend more of their lives in school: 69% of four-year-olds are now
>
> enrolled in preschool, compared with 29% in 1970. Yet poverty rates
>
> have remained essentially unchanged, average incomes have raised
>
> steeply, welfare dependency has declined, murder rates have dropped, and
>
> drug dependence has abated. (p. 39)

Statistical information specific to Arkansas showed similar findings as Peterson. Access

to Success, a final report conducted by the Arkansas Task Force on Higher Education

Remediation, Retention, and Graduation Rates (2008) indicated that 81.4% of the

population over the age of 25 holds a high-school diploma or its equivalent, but only

18.2% of adults hold a college degree.

Winston (2008) stated that education has become for many Americans a basic

value that defines, in part, their person. Winston argued, "For the poor it is the path out of

poverty, for immigrants the chance to find freedom and opportunity" (p. 64). He

continued, "Education gives the middle class a shot at the brass ring, and for every

parent, it fuels the hope that their children's lives will be better than their own" (p. 64).

Education does seem to provide many advantages for students. However, special issues

do exist that hamper students' success in life.

Special Issues

One special issue is established with the definition of college readiness and/or the lack of college readiness. Greene (2006) stated in his study that nationally "only about one in four of the high-school graduates who took the ACT program's college-readiness test last year met the benchmarks in reading comprehension, English, math, and science" (p. 23). Springer (2008) further stated that accountability testing is forcing schools to practice *educational triage*. This practice requires schools to provide a "disproportionate amount of their limited resources to 'bubble kids,' students who might otherwise perform just below the proficiency threshold" (p. 74). He continued by stating that although students will benefit from this increased attention to their particular deficit area, this practice will lead to a tradeoff in achievement gains. Marginally performing students will benefit from these types of practices at the expense of both the lowest- and highest-performing students.

The practice of *superscoring* was another special issue. Superscoring, a practice of using the highest scores per section to recalculate a composite ACT score is used for college admissions and remediation purposes. Many colleges throughout the United States superscore the ACT (Griesemer, 2012).

Implications

ACT (2007) offered many suggestions to prepare students to receive higher test scores in a better way. It is important to understand how ACT determines college readiness. Secondary educators teaching 7th through 12th grades using state adopted frameworks from each state as well as textbooks from each state's adoption list determine this process. In addition to those resources, successful college professors are also

surveyed to determine what they feel are skills and knowledge that a student would need in order to be successful in college.

Sizmur and Sainsbury (1997) pointed out that it is important to understand the information with particular assessment data and correctly interpret the results. Millman (1994) confirmed this and stated, the idea a criterion-referenced test "would permit valid inferences about what a student could and could not do" was, in his words, an "unfulfilled promise" (p. 19). Test data often provide only present conditions of knowledge. Although discussing criterion referenced testing, educators must explore definitions of other forms of assessments. Glaser (1963) stated that criterion referenced measures "depend upon an absolute standard of quality while what I term norm-referenced measures depend upon a relative standard" (p. 6). Glaser's future work with Nitko (Glaser & Nitko, 1971) further defined criterion referenced tests as

> A procedure for showing what an individual can (or cannot) do. Logical
> transition from the test to the domain and back again should be readily
> accomplished for criterion-referenced tests so that there is little difficulty
> in identifying with some degree of confidence the class of tasks that can
> be performed. (p. 654)

Sandler (1987) generally agreed with Glaser but proposed a testing system he called standards-referenced assessment. He stated, "[T]he primary function of a set of educational standards is to enable statement about the student's quality of performance or degree of achievement to be made without reference to the achievements of other students" (p.195). Sizmur and Sainsbury (1997) determined that at first glance, these two particular assessments were somewhat removed from each other. However, after a closer

examination, they determined standardized testing is very close to the "heart of what criterion referencing implies" (p. 134).

Comparison of Assessments

Students take the ACT under standardized conditions, and 4-year colleges used the scores as part of their admissions process. ACT is a battery of four multiple-choice tests of educational achievement in English, Mathematics, Reading, and Science with an optional Writing Test (ACT, 2007). The EOC and the benchmark examinations include a criterion-referenced portion taken at the completion of the course of study to determine whether students demonstrate attainment of knowledge and skills necessary for mastery of that subject. Educators give the EOC, the benchmark, and the ACT under very stringent security measures, and the company offers released items (Arkansas Department of Education, 2007).

<div align="center">

Hypotheses

</div>

Although several studies on other predictive effects on ACT student achievement have been conducted, the researcher found little research determining the predictive effects of high stakes state assessments on student achievement measured by ACT scores. The initial review of the literature suggested that no significant predictive effect would exist for the different predictor variables on ACT student achievement. Therefore, the researcher generated the following hypotheses.

1. No significant predictive effect will exist between lunch status, Arkansas End of Course Algebra I score, Arkansas End of Course Geometry score, Arkansas End of Level Literacy score, and overall grade point average courses on math

achievement measured by 12th grade ACT math scores for students in an educational cooperative in southwest Arkansas.

2. No significant predictive effect will exist between lunch status, Arkansas End of Course Biology score, overall grade point average, and End of Level Literacy score on science achievement measured by 12th grade ACT science scores for students in an educational cooperative in southwest Arkansas.

3. No significant predictive effect will exist between lunch status on overall academic achievement measured by 12th grade ACT composite score for students in an educational cooperative in southwest Arkansas.

Description of Terms

American College Test (ACT). The ACT (2007) organization defined the ACT assessment as a battery of four multiple-choice tests of educational achievement in English, Mathematics, Reading, and Science with an optional writing test. ACT tests are taken under standardized conditions.

Arkansas Comprehensive Testing, Assessment and Accountability Program. The Arkansas Department of Education (2010f) defined the Arkansas Comprehensive Testing Assessment and Accountability Program as a comprehensive system encompassing high academic standards, professional development, student assessment, and accountability for schools. The focus of the Arkansas Comprehensive Testing Assessment and Accountability Program is to improve student learning and classroom instruction; provide accountability by establishing expected achievement levels and reporting on student achievement; provide program evaluation data; and assist policymakers in the decision-making process.

Annual Yearly Progress. The United States Department of Education (2010a) defines annual yearly progress as an individual state's measure of progress toward 100% of students achieving the state's academic standards in at least reading/language arts and math.

Criterion Reference Test. The Arkansas Department of Education (2010f) defines criterion-referenced test as an assessment instrument customized around the Arkansas Curriculum Frameworks. The Benchmark Exams are criterion-referenced tests. In Arkansas, the test items are based on the academic standards in the Arkansas Curriculum Frameworks and are developed by committees of Arkansas teachers with support from the Department of Education and the testing contractor. Educators administer the criterion reference tests in Grades 3-8; the End-of-Course Exams in Algebra I, Geometry, and Literacy Exam are administered in Grade 11.

Cut score. Kiplinger (1997) defined cut scores as the minimum score a student must achieve in order to determine what students in each performance level should know and be able to perform.

End of Course Biology. The Arkansas Department of Education (2010f) defined EOC biology as a criterion-referenced test, which determines whether a student demonstrates attainment of knowledge and skills necessary for mastery of that subject, taken at the completion of the biology course of study.

End of Course Exam. The Arkansas Department of Education (2010f) defined the EOC exam as a criterion-referenced test, which determines whether a student demonstrates attainment of knowledge and skills necessary for mastery of that subject,

taken at the completion of a course of study. EOC Exams are given in grade 11 and include Algebra I, Biology, Geometry, and Literacy.

End of Course Geometry. The Arkansas Department of Education (2010f) defined EOC geometry as a criterion-referenced test, which determines whether a student demonstrates attainment of knowledge and skills necessary for master of that subject, taken at the completion of the geometry course of study.

Superscores. Wiley (2012) defined superscores as the calculation of an ACT composite score by averaging the highest scores in each section across multiple administrations of the test.

<div align="center">

Significance

</div>

Research Gap

Although several studies on other predictive effects on ACT student achievement have been conducted, the researcher found little research determining the predictive effects of high stakes state assessments on student achievement measured by ACT scores. The initial review of the literature suggested that no significant predictive effect would exist for the different predictor variables on ACT student achievement. The goal of this study was to determine the relevance of testing using two different testing formats. However, two problems surfaced that made the predictions difficult. First, determining the level of student success was difficult. Although ACT has a constant range in scores, cut scores on the Arkansas Comprehensive Testing Assessment and Accountability Program tests vary from year to year. This type of floating cut scores makes it difficult to ascertain a true indication of advanced, proficient, basic and below basic student achievement from year to year.

Second, motivating students to do their very best on any test is difficult, but this is especially hard with the Arkansas Comprehensive Testing Assessment and Accountability Program tests. On one hand, the incentives are different. ACT provides students opportunities to receive scholarship money when they score within a high pre-selected range. This allows them to attend a college of their choice at a reduced or free rate. In contrast, the Arkansas Comprehensive Testing Assessment and Accountability Program exams mandate students to receive remediation when they score within an inadequate pre-selected range. On the other hand, the periods for taking the tests are different. ACT requires a few hours during a morning session to complete. In contrast, Arkansas Comprehensive Testing Assessment and Accountability Program takes many hours to complete, and it is extended over several days. The difficulty in determining student success levels and motivating students make this topic hard to research. Some researchers have not addressed this needed subject. Therefore, more validation is required to make accurate decisions and determine possible solutions for research gaps.

Possible Implications for Practice

This study has the following implications for practice. First, by identifying factors that help predict ACT achievement, the researcher believes that remediation can take place sooner, and ACT scores can increase. By isolating areas of weakness in students' learning or educational gaps, students could receive remediation and re-teaching much earlier during the formative process, and therefore, increase achievement levels in the summative stage (ACT administration). Second, the earlier intervention would reduce the need for extensive remediation at the college level. One positive consequence to this would be a reduction of college cost. Due to additional cost of

college remediation for parents, students, and the state of Arkansas, any reduction in the number of students taking remedial courses would result in financial savings. Third, the results of this study could reach beyond classroom performance to career readiness. ACT has reported that high ACT scores show a direct correlation with students being college and career ready, both of which are indicators in recruiting potential industry (ACT, 2010). Fourth, this study could also lead to conversations allowing the consolidation of similar assessment formats into one test to measure student success. This implication could result in savings to the state of Arkansas who provides funding for state mandated testing. Increasing ACT scores has many benefits to the state and region.

Process to Accomplish

Design

A quantitative, regression strategy was utilized in this study. The independent or predictor variables for hypothesis 1 were lunch status, Arkansas End of Course Algebra I score, Arkansas End of Course Geometry score, Arkansas End of Level Literacy score, and overall grade point average The dependent or criterion variable was math achievement measured by the 12th grade overall ACT mathematics performance. The independent variables for hypothesis 2 were lunch status, Arkansas End of Course Biology score, overall grade point average, and End of Level Literacy score. The dependent variable was science achievement measured by 12th grade ACT science scores. The independent variables for hypothesis 3 were lunch status. The dependent variable was overall achievement measured by 12th grade ACT composite score.

Sample

   The sample for this study included students from four southwest Arkansas school districts. All students in these districts who took the ACT during the school years of 2006-2010 and took the Arkansas accountability exams from September of 2006 to May of 2010 comprised the population for this study. During this time, the student body at School 1 was comprised of approximately 62% Caucasian non-Hispanic, 34% African American, and 3% Hispanic. In School 1, 48% of its population qualified to receive free and/or reduced lunch. School 2 was comprised of approximately 55% Caucasian non-Hispanic, 34% African American, and 11% Hispanic. In School 2, 72% qualified to receive free and/or reduced lunch. School 3 was comprised of approximately 97% Caucasian non-Hispanic and 1.5% Hispanic, and 1.5% Native American/Asian. In School 3, 46% qualified to receive free and/or reduced lunch. School 4 was comprised of approximately 84% Caucasian non-Hispanic, 8% African American, 5% Hispanic, and 3% other including Native American and Asian. In School 4, 30% qualified to receive free and/or reduced lunch.

Instrumentation

   Several standardized assessments were used to provide the data needed for the predictor and criterion variables. First, the ACT was first administered in 1959 and has been used for college entrance in all 50 states since 1960. In 2008, 1.4 million students took the ACT and scored an average of 21.1, which was a decrease from 2007 of 0.1. Approximately one in every 3,300 students scored a perfect score of 36. Upon retesting, ACT (2008a) reported that 55% increased their composite score, 22% had no change in their composite score on the retest, and 23% decreased their composite score. This study

did not use superscores. Superscoring, a practice at many universities, involved an ACT taken multiple times with the highest score from each section being used for a recalculated composite ACT score. The researcher felt that in order to get a clear indication of true remediation, superscores would hinder the research findings.

ACT has a reliability score in English of .91, Mathematics of .91, Reading of .85, Science of .80, and a composite reliability score of .96 (ACT, 2007). ACT noted that Arkansas administered the ACT to 73% of all high school graduates, and they scored an average composite score of 20.6. The ACT exam contains 215 items with time limits for each area. Reading and Science both contain 40 questions with each timed at 35 minutes, mathematics has 60 questions and is a 60-minute test, and English has 75 questions lasting 45 minutes. The writing prompt component of the test was not used in this study. The mathematics, the science, and the composite scores were the only data from the ACT used for the study.

Legislated under Act 999 of 1999, also known as the Arkansas Comprehensive Testing Assessment and Accountability Program Act, the Act required that the EOC assessments be administered in Arkansas schools (Arkansas Department of Education, 2008). The State Board of Education regulations required the administration and participation of all students in specific grade levels and/or courses. These tests are considered criterion-referenced literacy tests. The EOC exams were administered beginning in the 2001-2002 school year with 2003 being the first year for published score reports in the state of Arkansas. In 2007 and 2008, assessment scores showed 51% of students scored at proficient or advanced levels with no more than 10% from any one school scoring at the advanced level. These examinations include items aligned to the

Arkansas Curriculum Framework and are developed by Arkansas teachers as well as the Arkansas Department of Education. Benchmark and EOC tests have a reliability score of .96 (National Council of Measurement Education, 2007). Four EOC tests were used as predictor variables.

First, the EOC Algebra I test contains 90 multiple-choice questions and 7 open response questions with time limits for each section (Arkansas Department of Education, 2010b). Teachers administer the test over a 2-day period with students testing half days. Five-minute breaks are allowable after each of the eight sections; 15-minute additional breaks are scheduled between three separate sections. Second, the EOC Geometry tests contain 90 multiple-choice questions and 7 open response questions with time limits for each section (Arkansas Department of Education, 2010e). The test is given as over a 2-day period with students testing half days. Five-minute breaks are allowable after each of the eight sections; 15-minute additional breaks are scheduled between three separate sections. Third, the EOC Biology test contains 90 multiple-choice questions and 7 open response questions with time limits for each section (Arkansas Department of Education, 2010d). Teachers give the test over a 2-day period with students testing half days. Five-minute breaks are allowable after each of the eight sections; 15-minute additional breaks are scheduled between three separate sections. Fourth, the EOC Literacy tests contain 64 reading and 24 writing multiple-choice questions, 8 open response questions, and 2 writing prompts with time limits for each section (Arkansas Department of Education, 2010a). The test is given as over a 2-day period with students testing half days. Five-minute breaks are allowable after each of the eight sections; 15-minute additional breaks are scheduled between three separate sections.

Data Analysis

To address the first hypothesis, a multiple regression was conducted using lunch status, Arkansas EOC Algebra I score, Arkansas EOC Geometry score, Arkansas End of Level Literacy score, and overall grade point average as the predictor variables. This hypothesis used math achievement measured by 12th grade ACT math scores as the criterion variable for students in an educational cooperative in southwest Arkansas. For the second hypothesis, a multiple regression was conducted using lunch status, Arkansas EOC Biology score, End of Level Literacy score, and overall grade point average as the predictor variables. The researcher, for this hypothesis, measured student achievement by 12th grade ACT science scores, and it served as the criterion variable for students in an educational cooperative in southwest Arkansas. For the third hypothesis, a multiple regression was conducted using lunch status as the predictor variable and overall achievement measured by 12th grade ACT composite score as the criterion variable for students in an educational cooperative in southwest Arkansas. Each analysis examined the significance of the model as a whole and then examined each predictor variable within each model to determine how much it contributed to the overall formula. The hypotheses were tested using a two-tailed test with a .05 level of significance.

CHAPTER II

REVIEW OF RELATED LITERATURE

The comprehensive literature review in this chapter provides a research-based foundation for this study and its findings. First, a brief overview of NCLB and high stakes testing is presented. Second, an examination of the history of the ACT is discussed. Third, the researcher took an in-depth look at ACT data. Fourth, material was presented to determine how grade point average is associated with the ACT. Fifth, curricular implications are offered to indicate how course selections play an important role in obtaining high ACT scores. Fifth, the researcher examined how many colleges use the ACT as an entrance instrument. Sixth, poverty, measured in schools by lunch status, is presented as a prominent factor in predicting academic performance. Finally, conclusions are drawn.

NCLB and High Stakes Testing

The NCLB (2002) mandated school districts to close the achievement gap with accountability, flexibility, and choice. Although this law is currently being revised, the Secretary of the United States Education Department, Arne Duncan, is clear on his expectations for the accountability piece of the law, which contains state mandated testing. Duncan (2011) stated, "Parents, teachers, and state leaders across the country understand that in order to prepare all young people to compete in the global economy, we must hold ourselves and each other accountable at every level of the education

system" (para. 3). This accountability piece was only a part of the bigger plan for education in President Obama's administration.

In his letter of support to the United States Department of Education (2010a), President Obama stated, "My Administration's blueprint for reauthorization of the Elementary and Secondary Education Act is not only a plan to renovate a flawed law, but also an outline for a re-envisioned federal role in education" (p. 1). President Obama intended his framework "to guide our deliberations and shared work—with parents, students, educators, business and community leaders, elected officials, and other partners—to strengthen America's public education system" (p. 2). Although A Blue Print for Reform proposed changes to the NCLB initiative, it further identified target areas. These areas included the following:

> (1) Improving teacher and principal effectiveness to ensure that every classroom has a great teacher and every school has a great leader; (2) Providing information to families to help them evaluate and improve their children's schools, and to educators to help them improve their students' learning; (3) Implementing college- and career-ready standards and developing improved assessments aligned with those standards; and (4) Improving student learning and achievement in America's lowest-performing schools by providing intensive support and effective interventions. (p. 3)

In addition, on the state level, Arkansas' Governor Mike Beebe also valued education and knew what it meant to the economy of tomorrow.

Governor Beebe, in numerous speeches, addressed the Arkansas Economic Development Commission (2009) with Arkansas' Strategic Plan. He noted, "Education

and economic development are inseparable" (p. 13). Governor Beebe went even further in the Strategic Plan and argued, "Economic development strategies are ineffective without an educated workforce. Education entities at all levels must be attuned to the workforce needs of businesses and align their missions with those of the AEDC" (p. 26). Because he wanted the initiative to encompass the educational system as a whole, he noted, "No levels, from Pre-K through college, are immune" (p. 26). Legislators looked to high stakes testing, particularly in the K-12 environment, to provide some direction to hold school accountable in preparing students for tomorrow's workforce.

Under the federal guidelines of NCLB, each state was required to set guidelines and establish assessment systems. The Center for Education Policy (2010) noted,

Act 1307 of 2009 mandates the development and implementation of only two high-stakes end-of-course assessments: Algebra I and English II. In the 2009-2010 school year, all students enrolled in Algebra I must score at the pass level on the Algebra I end-of-course examination in order to receive course credit. Beginning in the 2013-14 school year, all students enrolled in English II must score at the pass level on the English II end-of-course examination in order to receive credit for the course. (p. 1)

Therefore, according to the Arkansas Department of Education (2009), Act 1307 of 2009 required two types of EOC assessments, general and high stakes. In Arkansas, biology and geometry tests are considered general assessments, and algebra I and English II tests are considered high stakes assessments.

Although the federal mandates have continued, opponents of the law have gathered research that has raised questions about its effectiveness and long-term

implications. Huebert and Hauser (1999) indicated that high stakes testing was created to give meaning to state mandated tests. "Only if the stakes are high or if there is something valuable to be gained or lost—will teachers and students take the tests seriously and work hard to do their best"(p. 14). Tucker (2011) explained in his article the costs associated with the mandate that NCLB requires. He argued that although costly, it consumes only a small portion of education budgets. "No state comes even close to spending one percent of total per pupil expenditures on testing" (p. 21). Tucker went on to explain that even California, the country's largest and most financially challenged state, "spends less than $14 out of its $8,955 per-pupil total educational outlay on statewide standardized testing" (p. 22). Although financial resource allotment is important, Pershey's (2010) research warned, "[H]igh-stakes, summative tests do not identify the academic supports that students at risk would need to receive to enhance engagement…" (p. 60). Pershey continued, "[I]ndeed, summative assessments of school and district progress seldom identify how individual students can be helped to perform better on curriculum demands and on subsequent testing" (p. 60). To Pershey, little evidence existed linking the summative assessments to improved content delivery. Yet, content delivery is not the only area in which some of the high stakes tests help students.

Although research has been conducted using state mandated test scores, little research has been completed comparing state mandated tests with ACT scores, another high stakes test for college entry. Moreover, the ACT is not only used for measuring educational attainment, but they report the fastest growing career fields and interest in those fields by students who take the EXPLORE test in the 8th grade, the PLAN test in the 10th grade, and the ACT in the later grades. The ACT (2012a) reported, "Of the five

fastest-growing career fields based on 2008—18 annual projected job openings account for 56% of the demand for jobs calling for at least a 2-year degree" (p. 1). This is a change from previous years. ACT (2011b) stated 2011 percentages of ACT-tested high school graduates interested in the large growth careers were less than the projected demand. The top five large growth career fields' percentages are as follows with the corresponding ACT high school graduate career interest:

- Education with 15% job openings and 8% career interest

- Management with 13% job openings and 6% career interest

- Marketing and sales with 11% job openings and 2% career interest

- Community service with 9% job openings and 5% career interest

- Computer and information specialties with 8% job opening and 2% career interest

In all five listed career fields, the projected demand was nearly two times or more the potential supply.

History of the American College Test

The ACT emerged in the 1950s but was not founded until 1959. According to Jeffrey (2012), college students who were not deemed able to succeed in college were potentially "admitted either on the basis of scores earned on entrance exams offered by individual states or colleges or on the basis of family ties" (para. 3). At that time, the ACT was used as an admittance requirement for the most "academically able students" into nationally selective universities.

After World War II and into the beginning of the 1950s, a large number of students were approaching college age and wanted to attend college. With the United

States' financial recovery taking place by the end of that decade, more financial aid was being offered to students, and colleges were eager to increase enrollment. All of these factors contributed to the establishment of The American College Testing Program, Inc., now known as ACT.

The first testing program established by ACT (2012b), ACT Assessment, was designed to serve two populations, students and universities. First, the ACT assisted students in making decisions about their choice of universities as well as their programs of study. Second, the ACT aided universities by providing data on individual students to help determine their admission status and by helping determine if students would be successful in their various program offerings.

As the United States evolved and began to embrace a more educated society, the ACT organization saw the need to grow and evolve with the country. According to the ACT (2012b), ACT established new goals as the perspective on education changed from a static once and done learning to a learning spanning the length of people's lives. This new outlook on education affected how people planned and assessed their learning through their retirement and beyond. In 1996, the organization formally changed its name from American College Testing to ACT.

American College Test Data

In 1959, ACT gathered data and then reported on students' academic readiness for college level work. ACT (2011b) defined college readiness by ACT's College Readiness Benchmarks. College Readiness Benchmarks are the "minimum scores needed on the ACT subject area tests to indicate a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in corresponding first-year credit-bearing college

courses" (p. iii). In their study, ACT reported 66% of graduates met the English

readiness benchmark in 2011 and only 25% met all four of the College Readiness

Benchmarks. ACT went on to note, "52% of graduates met the Reading Benchmark,

while 45% met the Mathematics Benchmark. Just under 1 in 3 (30%) met the College

Readiness Benchmark in Science" (p. 1). ACT further indicated between the years of

2007 and 2011, students passing all four of the College Readiness benchmarks improved.

One of the difficult realities was that 28%, of all the students who graduated, did not meet

any of the Benchmarks. In Arkansas, ACT (2011c) reported, "35% met no benchmarks,

18% met one, 18% met two, 13% met three, and 17% met four" (p. 8). These percentages

proved to be lower than the national average.

ACT (2011a) National Trend data showed steady growth for students taking the

ACT exam. In 2011, almost half of the high school graduates in the United States took

the test at least once during their high school years, which totaled more than 1.5 million

students. From 2007 to 2011, ACT reported the number of high school graduates taking

the ACT grew by almost 25%. ACT noted that this was a 7% increase nationwide.

The national average ACT composite, as reported by ACT (2011a) Trend Data,

has increased slightly from 21.0 in 2001 to 21.1 in 2011. Arkansas tested 91% of all

students in 2011, and the national average was 60% in 26 other states (ACT, 2011d). The

average ACT composite score for Arkansas was 19.9. According to ACT (2011d), scores

indicated Arkansas is below the national average on each subtest:

The average national ACT English score was 20.6, while Arkansas' was 19.6.

The average national ACT mathematics score was 21.1, while Arkansas' was

19.7. The average national reading score was 21.3, while Arkansas' was 20.2.

The average national science score was 20.9, while Arkansas' was 19.8. (p. 7)

Although many Arkansas students opt not to take the optional writing portion of the

ACT, it is important to note that the national ACT writing score was 7.1, with Arkansas

scoring at 6.8.

Although many value the data provided by ACT, others believe that standardized

college admissions tests, such as ACT, hold some bias. This conclusion is made due to

the fact that particular ethnic groups typically score lower on college admissions tests

than do others (e.g., Cloud, 1997; Cortez, 1997; Cross & Slater, 1997; Hebel, 1999;

Marklein, 2000; St. John, Simmons, & Musoba, 1999).

Grade Point Average

Although little research has been conducted comparing high stakes testing to ACT

scores, numerous studies have shown a link between grade point average and ACT.

Noble and McNabb's (1989) research indicated variables associated with ACT scores.

Of these variables, grade point average, course work during the high school years, and

the type of high school attended were most strongly associated with ACT results. In this

study, although a significant contribution was made by the mathematics or science

courses taken, the authors reported that among educationally related factors, high school

grade point average was very strongly associated with ACT scores.

In a study conducted by Noble (2003),

[A]bout 50% to 65% of the variance in ACT scores can be explained by

high school grade average; mathematics and science course work taken;

enrollment in a college preparatory curriculum; needs for help with

reading, mathematics skills, and writing skills; time spent on educational

activities and homework; parent's level of education and English as

primary language in the home; perceived anxiety; and high school

attended. (p. 26).

Of the variance in ACT scores, again, grade point average accounted for a

significant amount.

Although the research seemed to indicate a strong relationship between grade

point average and ACT, caution should be used in assuming grade point averages could

replace ACT scores for college admission. Researchers indicated that the ACT exam

should continue to be used due to some subjectivity of grading practices. Noble and

McNabb (1989) stated that other factors influence grade point averages in high school.

Factors such as participation in class and attendance affect course grade, as well as a

student's desire to please a teacher. Noble and McNabb went on to state,

One possible explanation for the fact that grade-based measures from high

school and college correlate slightly better with each other than with a

standardized test is that they have more non-cognitive factors in common.

Their widespread use as measures of academic achievement is sometimes

attributed to the convenience of obtaining them rather than to their validity

as measures of academic achievement. (p. 15).

Even though these non-academic elements do not directly affect academic achievement, they do influence grading practices in a normal classroom setting.

Curricular Implications

Although a relationship between grade point average and ACT has been established, researchers also indicated that course selections play an important role in obtaining high ACT scores. A study conducted by ACT (2011b) indicated that high school graduates who took the appropriate number of core coursework in a particular area "were more likely to meet the corresponding ACT College Readiness Benchmark in 2011 than graduates who took less than a core curriculum (defined as four years of English and three years each of mathematics, science, and social studies)" (p. 6). The study further noted, "Graduates who completed three or more years of mathematics were more likely to meet the Mathematics Benchmark than graduates who took less than three years of mathematics, by 39 percentage points" (p. 6). The largest difference in score attainment was in students taking three years of mathematics. ACT further reported,

> High school graduates who completed at least a core curriculum earned composite test scores 2.2 to 3.1 points higher than the scores of students who did not take a core curriculum. Similar ranges of higher scores for core or more curriculum completers are noted for each subject test, English (2.5 to 3.5 points), Reading (2.2 to 3.0), Mathematics (2.3 to 3.0), and Science (2.0 to 2.7). (p. 17)

Thus, from 2007 until 2011, composite and subject scores were higher for students taking a core curriculum.

School districts and students seemed to be following the suggestions of research because of the 2011 students who graduated high school and took the ACT, 74% took a at least a minimum college preparatory core curriculum. A breakdown of the statistics indicated, "Asian students (81%) were most likely to complete a core curriculum, 78% of Pacific Islander and 76% of White students did so. Smaller percentages of African American (69%), American Indian (63%), and Hispanic (72%) students completed a core curriculum" (ACT, 2011b, p. 15). Thus, regardless of students' background, course selections play an important role in significantly increasing ACT scores.

College Implications

Although research suggested a relationship between ACT and high school grade point average, additional studies indicated further implications on two factors as it relates to college success. Noble and McNabb (1989) and Willingham, Lewis, Morgan, and Ramist (1990) noted high school grade point average and class rank have only a slight edge over ACT scores in predicting grade point average in college.   Further, Lotkowski, Robbins, and Noeth (2004) conducted a study to identify which academic and non-academic factors had the greatest effect on college retention and performance as indicated by college grade point average. Lotkowski et al.'s research revealed that "high school GPA and academic related skills and goals have a stronger relationship to retention than to performance, and ACT Assessment scores and academic self-confidence and achievement motivation have a stronger relationship to performance than to retention"(p.10).

Additional studies conducted by ACT (1999) targeted college enrollment status during the second fall semester after high school and a study of college retention, which

was defined as re-enrollment in a second year at the same institution. One conclusion was that when assessing admission criteria in predicting persistence into the second year of college, ACT scores and high school grades should be approximately equally predictive. In addressing the predictive capabilities of ACT scores and high school grades across racial and low-income students, ACT also found, "the results for enrollment were generally similar across racial/ethnic and family income groups, with ACT composite score as the better predictor of enrollment for African American and low-income students" (p. 2).

According to ACT (2011b) research on the prediction of the first year success in college, high school grade point averages along with ACT scores showed a slightly increased relationship for African American students over that of Caucasian American students. The inverse, however, was true for Hispanic students. This study explained, "smaller percentages of African American and Hispanic students than Caucasian American students achieve most benchmark values of high school average, ACT Composite score, or a predictive index based on ACT composite score and high school average jointly" (p. ii). Noble (2003) confirmed this research in her study finding that of the students taking the ACT, African American and Hispanic students generally have lower high school grade point averages and ACT Composite scores than do their Caucasian American counterparts. In the same study, Caucasian American students had, on average, higher first-year college grade point averages than African American and Hispanic students. Additionally, ACT (2011b) found that Caucasian American students, with the same or similar high school grade point average as their African American or Hispanic counterparts, typically have a higher probability of college success.

Poverty

Numerous studies have concluded that students' poverty level or socioeconomic status, identified in many schools as eligible for free or reduced lunches, has an adverse effect on academic performance. Huebert and Hauser's (1999) study indicated that additional factors should also be considered. Their research concluded, in general, students identified as coming from a low socioeconomic background made up a group of students who typically had few basic skills, low expectations of success, and teachers who were overall less qualified to meet the demands of students needing help with academic work.

Concerning children of poverty, ACT (2009) examined status measures based on EXPLORE, PLAN, and ACT data. The research from this study indicated that poverty level and proportion of racial/ethnic minority students were the two characteristics most strongly related to students' initial status in eighth grade proficiency as measured by attainment of the College Readiness Benchmarks for EXPLORE). Of these two characteristics, poverty level had the strongest association. The research concluded that schools with a higher percentage of free or reduced lunch students and with a higher percentage of minority students are more likely to have students with a lower initial status on grade level proficiency. The research further indicated the initial status of students was the strongest predictor of future academic achievement in later grades as measured by the College Readiness Benchmarks for PLAN and the ACT. This suggested the three performance sections on the EXPLORE exam may be directly associated with the performance on the PLAN and the ACT exams. One of the reasons for this direct association was because the scores on the three assessments reports used the same scale.

The study concluded, "high-poverty and high-minority schools would have a higher likelihood of being sanctioned inappropriately under an accountability system based on these status measures" (pp. 3-4). Thus, schools need to develop programs that address gaps in learning in the elementary and middle school grades to help students be successful in the earlier grades.

Several studies studied low socioeconomic status, identified as free or reduced lunch, and college completion rates. Most studies indicated that students' free or reduced lunch status, in general, has a strong effect on completion of the bachelor's degree. Astin (1993), in his study, contended, "[I]t is important to emphasize that this and all other effects of SES are over and above the effects of all ability measures and other input characteristics" (p. 6). Astin's research further noted that students' free or reduced lunch status and satisfaction with the undergraduate experience are correlated highly and positively to grade point average, admission into graduate school, and desire to return to the same university each year. His study further implied, "students from high SES families, compared to low SES students, could look forward to more positive outcomes in college, regardless of their abilities, academic preparation, or other characteristics" (p. 6). Hence, students' socioeconomic status plays a major role in college success.

In addition, Lotkowski et al.'s (2004) research analyzed the potential influences of poverty on college retention and performance. Lotkowski et al. cautioned that knowing the socioeconomic status of entering freshman is important. Knowing the socioeconomic status of students entering college for the first time provides valuable information about whether students need part-time or full-time jobs in addition to receiving financial aid. Their study indicated students from low socioeconomic

backgrounds tend to drop out of universities at a greater rate than those from higher socioeconomic backgrounds. Lotkowski et al. reported that several academic factors have a positive association with college retention. Among ACT scores, socioeconomic status, and high school grade point average, grade point average had the strongest positive relationship followed closely by socioeconomic status and then ACT scores. This study concluded, "[T]he overall relationship to college retention was strongest when SES, high school GPA, and ACT Assessment scores were combined with institutional commitment, academic goals, social support, academic self-confidence, and social involvement" (p. 8). Clearly, socioeconomic status combined with ACT scores has a significant predictive relationship with college retention. However, other factors are also needed to complete the picture.

Conclusion

Since 1959, ACT has assisted in the admission of potential college students by measuring student academic achievement. Although ACT provides data for universities as well as Kindergarten through 12th grade institutions, some suggest that an element of bias is evident; nevertheless, ACT is one of two prominent exams used for college admission purposes. Research also suggested students identified as free or reduced lunch status students, in general, seem to score lower than those who are from middle class families. At the current time, little research exists to suggest a correlation between students that score at acceptable levels under the accountability piece of NCLB and those that score well on the ACT in Arkansas. However, the research conducted on grade point average as it relates to ACT seemed to be clear. Researchers agree that grade point

average has predictive effects on the ACT, but course selection also playing a significant role in the findings.

This study attempted to address some of the predictors that possibly hinder or enhance student achievement on the ACT. The research indicated that future jobs would require a minimum of two years post high school education. Although this research will not directly affect the job market, this investigation could allow students to view a wider selection of job possibilities by increasing their knowledge of their potential. Educators today cannot predict the jobs for which they are preparing students; they should instead prepare them to be well-rounded, creative employees with sound decision-making skills (Bailie, 2011). Thus, this research project was designed to add to information concerning what factors affect ACT as related to state mandated testing in Arkansas and free and reduced lunch identification. To accomplish this, the study collected data from the 2006-2010 school years in order to create a more comprehensive picture.

CHAPTER III

METHODOLOGY

This study included several components, one of which was to determine if EOC and benchmark exam results had a predictive effect on math and science achievement measured by ACT scores. Although accountability can be interpreted differently, NCLB defined accountability in terms of high stakes testing. The high stakes tests include many instruments developed by the individual states. Each state determined its minimum scores for the EOCs that students needed to make in order to be deemed proficient or advanced in that particular subject area. In Arkansas, EOC tests were developed to measure achievement at the end of specific courses that were deemed crucial for future success and career readiness. In Arkansas, low levels of achievement on EOC tests continue to result in remediation courses and are viewed as punitive by many students because no state reward system has been established. In contrast to the EOC state tests, ACT rewards students who score at high levels as well as provides information for remediation for incoming freshmen college students.

Another component of the study was students' free or reduced lunch status and its predictive relationship on achievement measured by ACT scores. According to the review of literature, many studies suggested a relationship exists between low socioeconomic status measured by free or reduced lunch status and lower ACT scores. However, none of the studies was Arkansas specific. Research conducted by ACT

(1999) indicated, "[P]overty level and a proportion of racial/ethnic minority students are the two characteristics most strongly related to student's scores" (pp. 3-4). This study attempted to determine the predictive effects of these factors.

The third component of this study was to determine if there was a predictive effect on students' grade point averages on their ACT scores. The review of literature suggested a relationship exists between high grade point averages and high ACT scores. Noble and McNabb (1989) published several studies on behalf of ACT. Their findings were consistent with some of the previous research and indicated high school grade point average constituted the variable that has the strongest, direct correlation with ACT scores.

This study examined the predictive effects on ACT scores for students in an educational cooperative in southwest Arkansas. The researcher generated the following hypotheses:

1. No significant predictive effect will exist between lunch status, Arkansas End of Course Algebra I score, Arkansas End of Course Geometry score, Arkansas End of Level Literacy score, and overall grade point average courses on math achievement measured by 12th grade ACT math scores for students in an educational cooperative in southwest Arkansas.

2. No significant predictive effect will exist between lunch status, Arkansas End of Course Biology score, overall grade point average, and End of Level Literacy score on science achievement measured by 12th grade ACT science scores for students in an educational cooperative in southwest Arkansas.

3. No significant predictive effect will exist between lunch status on overall academic achievement measured by 12th grade ACT composite score for students in an educational cooperative in southwest Arkansas.

This chapter will discuss the research design, the selection and description of the sample population, and how scores were obtained. Additionally, the chapter will describe the instrument used to measure student achievement, the data collection procedures, the limitations, and the statistical analysis processes.

Research Design

A quantitative, regression strategy was used in this study. The independent or predictor variables for hypothesis 1 were lunch status, Arkansas EOC Algebra I score, Arkansas EOC Geometry score, Arkansas End of Level Literacy score, and overall grade point average. The dependent or criterion variable was math achievement measured by the 12th grade overall ACT mathematics score. The independent variables for hypothesis 2 were lunch status, Arkansas EOC Biology score, overall grade point average, and End of Level Literacy score. The dependent variable was science achievement measured by 12th grade ACT science scores. The independent variables for hypothesis 3 were lunch status, eighth grade Benchmark Exam score, and overall grade point average. The dependent variable was overall achievement measured by 12th grade ACT composite score.

Sample

The population for this study included 1,696 students that took the ACT, 4,919 students that took state mandated assessments, and 5,867 students' that had student data records. The researcher pulled these students from four southwest Arkansas school

districts. All students in these districts who took the ACT during the school years of 2006-2011 and took the Arkansas accountability exams from September of 2002 to May of 2011 comprised the sample for this study. During this time, the student body at School 1 was comprised of 61% Caucasian non-Hispanic, 35% African American, 3% Hispanic, and 1% Native American/Asian students. Of the students in School 1, 46% of its population qualified to receive free and/or reduced lunch. School 2 was comprised of 55% Caucasian non-Hispanic, 32% African American, 11% Hispanic, and 2% Native American/Asian students. Of the students in School 2, 70% of its population qualified to receive free and/or reduced lunch. School 3 was comprised of 97% Caucasian non-Hispanic and 3% Hispanic students. Of the students in School 3, 38% of its population qualified to receive free and/or reduced lunch. School 4 was comprised of 81% Caucasian non-Hispanic, 8% African American, 6% Hispanic, and 3% Other including Native American and Asian. Of the students in School 4, 40% of its population qualified to receive free and/or reduced lunch. Table 1 provides the percentages of the school race and socioeconomic demographics.

Table 1

School Statistical Information in Percentages

Categories	School 1	School 2	School 3	School 4
Caucasian	61%	55%	97%	81%
African-American	35%	32%	0%	8%
Hispanic	3%	11%	3%	6%
Native American/Asian	1%	2%	0%	3%
Free/Reduce Lunch	46%	70%	38%	40%

Instrumentation

Because a multiple regression strategy was used for this study, various types of predictor and criterion variables were used. First, there were seven predictor variables used for the three hypotheses. Socioeconomic status was measured by the free/reduced or regular lunch status of the participants involved in the study. In addition, high school overall grade point average was gathered from the schools. The remaining predictor variables were measured by standardized assessments: EOC Algebra I exam, EOC Geometry exam, EOC Biology exam, End of Level Literacy exam, and the eighth grade Benchmark exam. The Arkansas EOC Algebra I, EOC Geometry, and EOC Biology tests contain 90 multiple-choice questions and 7 open response questions with time limits for each section (Arkansas Department of Education, 2010b). Each test is given over a two-day period with students testing half days on both days. Five-minute breaks are allowable after each of the eight sections, and 15-minute additional breaks are scheduled between three separate sections. Test items for the EOC exams consist of questions that align to the content specific standards of the area courses and the Arkansas Mathematics and Science Curriculum Frameworks (Arkansas Department of Education, 2012).

End of Level Literacy tests contain 64 reading and 24 writing multiple-choice questions, 8 open response questions, and 2 writing prompts with time limits for each section (Arkansas Department of Education, 2010d). The test is given over a two-day period with students testing half days on both days. Five-minute breaks are allowable after each of the eight sections, and 15-minute additional breaks are scheduled between three separate sections. The End of Level Literacy test consists of questions aligned to

39

the English Language Arts Curriculum Framework (Arkansas Department of Education, 2012).

The eighth grade benchmark exam contains 35 math, 64 reading, and 59 writing multiple-choice questions (Arkansas Department of Education, 2010c). The exam also contains six math and four reading open response questions and two writing prompts. The test is given over a 4-day period with students testing half days. Five-minute breaks are allowable after each of the 16 sections, and 15-minute additional breaks are scheduled between five separate sections. This Benchmark test aligns with the Arkansas Mathematics and English Language Arts Curriculum Frameworks (Arkansas Department of Education, 2012).

All of these exams were legislated under the Act 999 of 1999, also known as the Arkansas Comprehensive Testing Assessment and Accountability Program Act. This Act required that Arkansas schools administer the EOC and benchmark assessments each school year (Arkansas Department of Education, 2008). The State Board of Education regulations require the administration and participation of all students in specific grade levels and/or courses. The tests are criterion-referenced literacy tests, and the tests began in the 2001-2002 school year with 2003 being the first year for published score reports in the state of Arkansas. In 2007 and 2008, assessment scores showed 51% of students scored at proficient or advanced levels with no more than 10% from any one school scoring at the advanced level. These examinations include items that are aligned to the Arkansas Curriculum Framework and are developed by Arkansas teachers as well as the Arkansas Department of Education. Benchmark and EOC tests have a reliability score of .96 (National Council of Measurement in Education, 2007).

Second, the dependent or criterion variables for the three hypotheses also were also measured by standardized assessments in the form of subsections and the overall performance score from the ACT. According to ACT (2007), the exam contains 215 items with time limits for each area. Reading and Science both contain 40 questions and each are timed at 35 minutes, Mathematics has 60 questions and is a 60-minute test, and English has 75 questions lasting 45 minutes. The writing prompt component of the test was not used in this study. The Mathematics, Science, and composite scores were the only data used to measure the dependent variables for the study.

The ACT was first given in 1959 and has been administered in all 50 states since 1960. In 2008, 1.4 million students took the ACT and scored an average of 21.1, which was a decrease from 2007 of 0.1 points. Approximately one in every 3,300 students scored a perfect score of 36. Upon retesting, ACT (2008b) reported that 55% increased their composite score, 22% had no change in their composite score on the retest, and 23% decreased their composite score. ACT has a reliability score in English of .91, mathematics of .91, reading of .85, science of .80, and a composite reliability score of .96 (ACT, 2007). ACT (2011d) noted that Arkansas administered the ACT to 73% of all high school graduates, and they scored an average composite score of 20.6.

Data Collection Procedures

After providing documentation of an Institutional Review Board approval and the Dissertation Approval Form, the researcher requested and obtained student information through the Arkansas Research Center. All identifiable student information was removed by the Arkansas Research Center and replaced by a specific research number. The data were delivered via password protected secure website. Student data were exported to an

excel spreadsheet where duplicate student identifiers were eliminated, and each hypothesis was organized. Students with missing values were omitted from the study. The total number of students with all data was 1,239 for hypothesis 1, 545 for hypothesis 2, and 1,341 for hypothesis 3. After exporting, cleaning, and eliminating missing variables, the data were analyzed using SPSS to determine if any predictive effects occurred. After data was entered and analyzed using SPSS, student data were deleted from any and all computers.

Analytical Methods

Data from this study were subjected to statistical analysis. All students were classified according to grade, lunch status, ACT scores, Benchmark exam scores, EOC exam scores, and overall grade point average. All variables were analyzed using descriptive techniques appropriate to the level of measurement for each variable. SPSS 17 was used to analyze the variables. Before conducting the analyses, the researcher examined the data to determine if assumptions were met for a multiple regression strategy. A scatter plot was generated in order to determine if variables had a linear relationship. Residual plots were conducted to determine linearity, normality, and homoscedasticity. Possible outliers were identified and deleted, if necessary. Collinearity statistics were used to determine if variables met the necessary requirements for tolerance and VIF of less than .1 or greater than 10 (Mertler & Vannatta, 2010). Data analysis conclusions, findings, and discussions were reported in the results chapter.

Limitations

Limitations are always important to note to allow the reader of any study to interpret the findings in light of issues that are beyond the researcher's control. Four

limitations existed in the plan for implementation. First, one limitation was the school

districts of the participants the study. Although there were a significant number of

students in each of the school districts, all the districts involved were from southwest

Arkansas. Because the participants were only from one region of Arkansas, this limited

the total participants eligible for the study and could affect the generalizability of some of

the results. Table 1 also demonstrated that the racial makeup of the students was not

equal across races.

Second, another limitation of this study was the academic level of the students

taking the ACT. The participants, on average, were generally high achieving, college

bound students, which may not have reflected an accurate predictability between the

independent and dependent variables.

Third, the total number of students eligible for hypothesis two was limited due to

the number of times EOC Biology had been given. This limitation was based on EOC

Biology being given for the first time in 2008 (Arkansas Department of Education, 2012).

Some of the Arkansas EOC tests had been given over several years and provided more

data that are available. The limited period also may have affected the comfort level in

teaching and taking the exam.

Fourth, the structure of the two tests served as a limitation. Although both of the

exams use standardized testing procedures, the ACT was more comprehensive in nature.

For example, on one hand, the ACT science subtest measures science achievement over

several different science courses ranging over several years of study. On the other hand,

the EOC Biology exam measures science achievement over the semester or school year

of a particular course. In addition, because the ACT science subtest is usually not taken

until students' later high school years, some of the information learned in earlier science

courses might be forgotten. However, the EOC Biology test is given immediately after

the biology class is completed.

CHAPTER IV

RESULTS

This study explored the predictive effects exhibited between lunch status, EOC and/or benchmark exams, and grade point average on students' academic achievement measured by the ACT test for students in four public schools in southwest Arkansas. The researcher used a quantitative, multiple regression approach. Lunch status, Arkansas EOC Algebra I scores, Arkansas EOC Geometry scores, Arkansas EOC Biology scores, Arkansas Eighth Grade Benchmark Exam, Arkansas End of Level Literacy scores, and overall grade point average served as independent or predictor variables. Academic achievement used the dependent or criterion variables and was measured by the ACT composite, ACT mathematics, ACT science scores. The results of this analysis are contained within this chapter for the three hypotheses.

Hypothesis 1

The first hypothesis stated that no significant predictive effect will exist between lunch status, Arkansas EOC Algebra I score, Arkansas EOC Geometry score, Arkansas End of Level Literacy score, and overall grade point average courses on math achievement measured by 12th grade ACT math scores for students in an educational cooperative in southwest Arkansas. Before conducting the analysis, the researcher examined data to determine if assumptions for multiple regression were met. A scatter plot was generated, which determined that all variables had a linear relationship. Initial

45

screening was also conducted for normality. The analyzed data indicated most of the predictor variables fell within an acceptable range. An examination of the correlation table indicated a strong correlation between two predictors, EOC Algebra and EOC Geometry (.846); however, neither of the predictor variables had a tolerance less than .1 or a VIF greater than 10. (Mertler & Vannatta, 2010). Therefore, multicollinearity was not a problem, and due to the limited number of predictors in the model, the choice was made to keep the variables in the model. Two cases identified as outliers were deleted, and the regression analysis was conducted once more. The Pearson correlation results for Hypothesis 1 are found in Table 2.

Table 2

Pearson Correlation Results for Hypothesis 1 on ACT Mathematics

Pearson *r*	ACT Math	EOC GEO	EOC ALG	EOC LIT	Lunch Status	Overall GPA
ACT Math	1.000	.814	.760	.669	.323	.661
EOC GEO	.814	1.000	.846	.729	.329	.678
EOC ALG	.760	.846	1.000	.724	.317	.623
EOC LIT	.669	.729	.724	1.000	.331	.671
Lunch Status	.323	.329	.317	.331	1.000	.335
Overall GPA	.661	.678	.623	.671	.335	1.000

Note. EOC ALG = End of Course Algebra; EOC Geo = End of Course Geometry; GPA = Overall Grade Point Average; EOC Lit = End of Course Literacy.

First, the model was examined to determine if all the variables as a whole predicted math achievement. A standard multiple regression was conducted to determine

the accuracy of the predictor variables on academic achievement performance measured by the ACT mathematics test. Regression results indicated that the overall model significantly predicts ACT mathematics, $R^2 = .716$, $R^2_{adj} = .715$, $F(5,1231) = 621.704$, $p <$ .001. Therefore, the model is better than the mean and accounts for 71.6% of the variance in ACT mathematic scores. The results are displayed in Table 3.

Table 3

ANOVA Results for the Regression Model on ACT Math

Model	*SS*	*df*	*MS*	*F*	*p*
Regression	19397.586	5	3879.517	621.704	.000
Residual	7681.611	1231	6.240		
Total	27079.196	1236			

Second, an analysis was run to determine what and how much each predictor variable contributed to the model. A summary of regression coefficients is presented in Table 3 and indicates that three (EOC ALG, EOC GEO, GPA) of the five variables significantly contributed to the model.

Table 4

Regression Results for Hypothesis 1 Predictors on ACT Math

Model	*B*	*SE*	*β*	*t*	*p*	Tolerance	VIF
1(Constant)	-4.062	.800		-5.079	.000		
EOC Alg	.024	.003	.220	7.450	.000	.264	3.793
EOC Geo	.058	.004	.495	16.019	.000	.241	4.148
GPA	1.055	.152	.154	6.946	.000	.467	2.141
EOC Lit	.010	.006	.042	1.717	.086	.380	2.631
Meal Status	.239	.168	.023	1.426	.154	.859	1.164

Note. EOC Alg = End of Course Algebra; EOC Geo = End of Course Geometry; GPA = Overall Grade Point Average; EOC Lit = End of Course Literacy.

Hypothesis 2

The second hypothesis stated that no significant predictive effect will exist between lunch status, Arkansas EOC Biology score, overall grade point average, and End of Level Literacy score on science achievement measured by 12th grade ACT science scores for students in an educational cooperative in southwest Arkansas. Before conducting the analysis, the researcher examined data to determine if assumptions for multiple regression were met. A scatter plot was generated, which determined that all variables had a linear relationship. Initial screening was also conducted for normality. Results indicated most of the predictor variables fell within an acceptable range. An examination of the correlation table did not indicate a strong correlation between predictors. Additionally, none of the predictor variables had a tolerance less than .1 or a VIF greater than 10. (Mertler & Vannatta, 2010). Therefore, multicollinearity was not a

problem. No outliers were identified. The Pearson correlation results for Hypothesis 2 are found in Table 5.

Table 5

Pearson Correlation Results for Hypothesis 2 on ACT Science

Pearson *r*	ACT Science	EOC BIO	EOC LIT	Lunch Status	GPA
ACT Science	1.000	.678	.633	.331	.608
EOC BIO	.678	1.000	.730	.399	.644
EOC LIT	.633	.730	1.000	.358	.700
Meal Status	.331	.399	.358	1.000	.376
GPA	.608	.644	.700	.376	1.000

Note. GPA = Overall Grade Point Average; EOC Bio = End of Course Biology; EOC Lit = End of Course Literacy.

First, the model with all the predictor variables was examined to determine if it predicted science achievement. A standard multiple regression was conducted to determine the accuracy of the independent variables (lunch status, Arkansas EOC Biology [EOC BIO], Arkansas End of Level Literacy [EOC LIT], and overall grade point average [GPA]) predicting achievement performance on ACT science. Regression results indicated that the overall model significantly predicts ACT science, $R^2 = .523$, $R^2_{adj} = .520$, $F(4,540) = 148.234$, $p < .001$. Therefore, the model is better than the mean and accounts for 52.3% of variance in ACT science scores. Table 6 displays the results.

Table 6

ANOVA Results for the Regression Model on ACT Science

Model	*SS*	*df*	*MS*	*F*	*p*
Regression	7114.672	4	1778.668	148.234	.000
Residual	6479.500	540	11.999		
Total	13594.172	544			

Second, an analysis was run to determine what and how much each predictor variable contributed to the model. A summary of regression coefficients is presented in Table 7 and indicated that three (EOC BIO, EOC LIT, GPA) of the four variables significantly contribute to the model.

Table 7

Regression Results for Hypothesis 2 Predictors on ACT Science

Model	*B*	*SE*	*β*	*t*	*p*	Tolerance	VIF
1(Constant)	-2.509	1.617		1.551	.121		
GPA	1.447	.297	.213	4.869	.000	.463	2.161
EOC Bio	.046	.005	.392	8.545	.000	.419	2.384
EOC Lit	.043	.011	.189	3.898	.000	.376	2.656
Meal Status	.282	.342	.027	.825	.410	.815	1.226

Note. GPA = Overall Grade Point Average; EOC Bio = End of Course Biology; EOC Lit = End of Course Literacy.

Hypothesis 3

The third hypothesis stated that no significant predictive effect will exist between lunch status on overall academic achievement measured by 12th grade ACT composite score for students in an educational cooperative in southwest Arkansas. Initial analysis of eighth grade Benchmark scores indicated a bimodal distribution. Upon further examination, the researcher determined that scale score had been adjusted in 2005, which caused the data to be unusable in this form. On October 5, 2005, Arkansas Department of Education Commissioner Ken James stated in a letter to parents that, new cut scores to divide the scores into the categories of below basic, basic, proficient and advanced had to be developed (Arkansas Department of Education, 2005). He further stated that this change was due to the revision in the English Language Arts Frameworks and requirements from NCLB. Due to this information, eighth grade benchmark data were eliminated from the study, this left two independent variables lunch status and overall grade point average.

Before conducting a regression analysis, the data on the two predictors and outcome variable were examined to determine if assumptions for multiple regression were met. A scatter plot was generated, which indicated that all pairs of variables had a linear relationship. In addition to this, the residual plot of the predicted residuals against the standardized residuals indicated the assumptions of normality, homogeneity of variance, and linearity fell within an acceptable range. Additionally, none of the predictor variables had a tolerance less than .1 or an *r* VIF greater than 10. This would suggest multicollinearity was not a problem (Mertler & Vannatta, 2010). No outliers

were identified. An examination of the correlation table did not indicate a strong

correlation between predictors as shown in Table 8.

Table 8

Pearson Correlation Results for Hypothesis 3 on ACT Composite

Pearson *r*	ACT Composite	Lunch Status	GPA
ACT Composite	1.000	.363	.689
Lunch Status	.363	1.000	.333
GPA	.689	.333	1.000

Note. GPA = Overall Grade Point Average.

First, the model was examined to determine if it predicted overall achievement. A

standard multiple regression was conducted to determine the accuracy of the independent

variables (lunch status, and overall grade point average [GPA]) predicting overall

achievement performance measured by the ACT composite. Regression results indicated

that the overall model significantly predicts ACT composite, $R^2 = .494$, $R^2_{adj} = .494$,

$F(2,1336) = 652.960$, $p < .001$. This model is better than the mean and accounts for

49.4% of variance in ACT composite scores. The results are displayed in Table 9.

Table 9

ANOVA Results for the Regression Model on ACT Composite

Model	SS	df	MS	F	p
Regression	16296.882	2	8148.441	652.960	.000
Residual	16672.247	1336	12.479		
Total	32969.129	1338			

Second, an analysis of the coefficients was run to determine how much each predictor variable contributed to the model. A summary of regression coefficients is presented in Table 10 and indicated that both grade point average and meal status significantly contribute to the model.

Table 10

Regression Results for Hypothesis 3 Predictors on ACT Composite

Model	B	SE	β	t	p	Tolerance	VIF
1(Constant)	4.411	.492		8.957	.000		
Meal Status	1.637	.225	.150	7.275	.000	.889	1.124
GPA	4.556	.147	.639	30.962	.000	.889	1.124

Note. GPA = Overall Grade Point Average.

CHAPTER V

DISSCUSION

NCLB (2002) required states to increase public school accountability through state mandated testing. These requirements have driven schools to make curricular decisions based on high stakes test results. Many states have found ways to entice students to perform at higher levels by offering financial incentives (Bishop, 2004). A similar practice is that of ACT, which provides scholarship monies for students that score within a particular range. Although ACT has a more proactive history of rewarding good scores, NCLB and the state of Arkansas use a punitive approach for schools that fail to meet minimum requirements.

The purpose of this study was to examine possible predictive relationships on 12th grade ACT scores for students in an educational cooperative in southwest Arkansas. Predictor variables included lunch status, the EOC Algebra exam, the EOC Geometry exam, the End of Level Literacy exam, the EOC Biology, the eighth grade Benchmark exam, and overall grade point average. The criterion variables consisted of academic achievement measured by the ACT composite, ACT mathematics, ACT science scores. Student data were collected from four school districts in southwest Arkansas. All students who took ACT during the school years of 2006-2011 and also took the Arkansas accountability exams from September 2002 to May of 2011 comprised the sample for this study.

This chapter draws conclusions on the results from the data collected and the analysis performed while considering relevant published literature. Recommendations are then made for school and state leaders based upon the results of the analysis concerning ACT scores. Finally, the researcher discussed the significance of this study and the possible implications.

Conclusions

A quantitative, multiple regression was used in this study. The independent or predictor variables were lunch status, Arkansas EOC Algebra I score, Arkansas EOC Geometry score, Arkansas EOC Biology score, Arkansas End of Level Literacy score, eighth grade Benchmark math and literacy score, and overall grade point average. The dependent variables used to determine academic achievement were 12th grade ACT math score, 12th grade ACT science score, and 12th grade ACT composite score. This study determined the accuracy of the independent variables in predicting the dependent variables and the percentage of variance between the variables.

Hypothesis 1

The first hypothesis stated that no significant predictive effect will exist between lunch status, Arkansas EOC Algebra I score, Arkansas EOC Geometry score, Arkansas End of Level Literacy score, and overall grade point average courses on math achievement measured by 12th grade ACT math scores for students in an educational cooperative in southwest Arkansas. Regression results indicated that the overall model significantly predicts 12th grade ACT math scores with 71.6% variance. EOC Algebra I, EOC Geometry, End of Level Literacy and grade point average indicated the most

significant effects, and lunch status showed the least. Due to the statistical significance indicated by the analysis, the null hypothesis was rejected.

It is important to note that this study used 1,239 student records that may suggest the ability to generalize the results to the entire state of Arkansas. Although the overall model was statistically significant, student lunch status was the least significant at .323. Previous research indicated the statistical significance in both lunch status and grade point average on ACT scores (Noble, 2003). Although the present data reflected those findings, further research could be beneficial in order to determine to what extent lunch status predicts ACT math. Additional studies could examine lunch status using free, reduced, and paid student status information.

The model further indicated that EOC Geometry test scores, EOC Algebra test scores, and End of Level Literacy were the most statistically significant. Noble's (2003) study indicated the same conclusion when she stated "Of the 23 courses entered into the model, only mathematics, chemistry, and physics courses accounted for a statistically significant proportion of the variance in any of the ACT scores"(p.18). Therefore, a conclusion can be made from this data along with other research that strong reading skills along with algebra and geometry background knowledge are important to scoring well on the math portion of the ACT.

Hypothesis 2

The second hypothesis stated that no significant predictive effect will exist between lunch status, Arkansas EOC Biology score, overall grade point average, and End of Level Literacy score, on student achievement measured by 12th grade ACT science scores for students in an educational cooperative in southwest Arkansas. Regression

results indicated that the overall model significantly predicted 12th grade ACT science scores with 52.3% variance. EOC Biology, End of Level Literacy, and grade point average indicated the most significant effects, and lunch status showed the least. Due to the statistical significance indicated by the analysis, the null hypothesis was rejected.

A total of 545 student records were used to analyze this hypothesis. Additional student records may need to be studied in order to generalize this information throughout Arkansas. Although the overall model was statistically significant; student lunch status was the least significant. Previous research indicated the statistical significance of lunch status on ACT scores (Noble, 2003). This may indicate a need for further predictive analysis on students classified as free versus reduced versus paid and how the classifications may affect ACT scores.

According to the model, EOC Biology showed the most statistical significance on ACT Science scores followed by End of Level Literacy. Although this analysis indicated the need for strong biology content knowledge, it also indicated the need for other reading and science reasoning skills, which are elements of EOC Biology and End of Level Literacy preparation and exams. Noble (2003) went further stating that multiple years of science curriculum had a predictive effect on a student's ACT score.

Hypothesis 3

The third hypothesis stated that no significant predictive effect will exist between lunch status, eighth grade Benchmark Exam score, and overall grade point average on overall achievement measured by 12th grade ACT composite score for students in an educational cooperative in southwest Arkansas. A change in scale scores by the Arkansas Department of Education in the 2005 testing session rendered the eighth grade

Benchmark scores unusable. As a result, only two independent variables were used in the model: lunch status and grade point average. With the disallowed independent variable eliminated, regression results indicated the overall model significantly predicted 12th grade ACT composite score with a 13.1% variance. Grade point average indicated the most significant effects, and lunch status showed the least. Due to the statistical significance indicated by the analysis, the null hypothesis was rejected.

Although the overall model was statistically significant; student lunch status was the least significant, and grade point average was the most significant. Previous research indicated a strong correlation between lunch status as well as grade point average on ACT scores (Noble, 2003). This may indicate a need for further data collection and analysis on grading practices of secondary teachers. In addition, more emphasis should be placed on lunch status; this focus would help determine the validity of previous studies with statistically significance results on ACT. In hypothesis 3, 1,339 student records were examined, which may indicate the ability to generalize this study throughout Arkansas.

Recommendations

This study was designed to obtain information on the predictive effects of various Arkansas EOC exams, lunch status, and overall grade point average on different parts of the ACT exam. This study was conducted in four school districts in Southwest Arkansas and was limited to one educational cooperative area. The study looked at three different predictive models. The findings of the study may have direct implications on practices and policies in districts in Southwest Arkansas. Moreover, given that numerous districts throughout Arkansas and the nation are faced with challenges in meeting accountability

requirements through high stakes testing, this study may have recommendations on educational policies and practices.

First, additional research should be completed to predict achievement measured by other ACT subsections. Additional research could help teachers obtain a better understanding of the extent the independent variables predict achievement in other ACT tests. Furthermore, lunch status could be emphasized to determine how it correlates with high stakes testing. Although lunch status was a statistically significant predictor of ACT scores, an extensive examination of supplementary programs offered to free or reduced lunch status students could also assist in determining the types of programs that could have a positive effect on student achievement as determined by the ACT. Further, future studies should subdivide lunch status into free, reduced, and regular paid lunches to determine how each level of the socioeconomic variable predicts ACT student achievement.

Second, in all three hypotheses, grade point average had one of the strongest variable correlations. This particular variable raises some questions due to the subjectivity of grading. Additional research should be conducted in order to determine the amount of rigor in the grading practices of teachers as it relates to ACT scores.

Third, all state mandated testing that were examined in this study showed a highly predictive effect on ACT. This finding could allow for possible policy recommendations. Further research should be conducted to determine if the ACT could replace any/all state mandated testing. Additional research should also be conducted to determine if all state mandated exams, including those conducted in the elementary school setting, provide the same predictive effects.

Implications

Although the high predictive effect of state mandated testing on ACT was an unexpected result, testing services appear to be duplicated. The state of Arkansas not only expends funds for Benchmark and EOC exams but also for the EXPLORE tests (8th grade) and the PLAN tests (10th grade), which are produced by ACT. These two tests provide not only scores for the EXPLORE and PLAN test but a predictive ACT score. A suggested policy recommendation would include the elimination of eighth grade benchmark and EOC exams, which should be replaced with ACT testing products. This would provide for a more streamlined approach to testing as well as eliminate additional costs for the state of Arkansas.

The model in this study indicated a high predictive effect of overall grade point average on ACT scores. Additional research further supported the findings. It is important that school districts determine the level of rigor within their schools. Determining what level of proficiency is needed per letter grade assigned will not only enable students to understand the grading system but can produce an even stronger predictive effect on student achievement as measured by ACT.

Another surprising result of this study was the amount of predictability of lunch status on ACT scores as compared to other variables. It is important to remember when reviewing possible implications for practice that students' lunch status had a significant predictive effect on ACT score for all three hypotheses. One possible explanation for these results was the amount of professional development that focuses on strategies for educating low socioeconomic students and closing the achievement gap. The results in this model may indicate the success of such efforts, but more research will need to be

conducted. It is imperative that administrators and universities not only continue to strive in educating teachers with best practice strategies as it relates to low socioeconomic students but also to further enhance students' educational opportunities.

The findings from this study along with ACT research indicated, "[S]tudents' initial status is the strongest predictor of their later status in 10th and 12th grade (i.e., proficiency as measured by attainment of the College Readiness Benchmarks for PLAN and the ACT)" (ACT, 2009, p. 3). By identifying factors that help predict ACT achievement, remediation could take place sooner, which could lead to an increase in academic success. Taking this approach, instructors could isolate areas of weakness in students' learning, which would allow students to receive remediation and re-teaching much earlier during the formative process, and therefore, increase achievement levels in the summative stage (ACT, 2012b). This type of early intervention could reduce the need for extensive remediation at the college level. A positive consequence to this would be a reduction of college cost. Due to additional cost of college remediation for parents, students, and the state of Arkansas, any reduction in the number of students taking remedial courses would result in financial savings, which is particularly important to students of low-income families.

An additional result of this study could reach far beyond classroom performance to career readiness. ACT has reported that high ACT scores show a direct correlation with students being college and career ready, both of which are indicators in recruiting potential industry (ACT, 2010). Again, this implication could result in savings to the state of Arkansas by reducing the amount of funding necessary for state mandated testing and by providing assistance in recruiting new industry for the state. The Arkansas

Economic Development Commission (2009) stated, "Successful business recruitment will require substantive changes to educational and training systems in regard to curriculum development and delivery, flexibility and funding of existing programs, and construction of new programs which reflect economic goals" (para. 10). With an ever-changing global economy industry, recruitment is necessary for the survival and betterment of the Arkansas and its citizens. An educated workforce assists in such recruitment.

Allowing students and educators to reduce the amount of time focused on state mandated testing and shift to exams like ACT, while using predictive factors such as student's grade point average and lunch status, should result in decreased college remediation and increased college success. A focus on ACT preparation would allow for significant savings to the state as well as its families. Additionally, this type of focus could potentially assist in the recruitment and the retention of industry, could increase the per capita income, and thereby, could improve the overall living conditions of Arkansans.

REFERENCES

Achieve, Inc. (2005). *Rising to the challenge: Are high school students prepared for college and work*. Retrieved from the Achieve, Inc. website: http://www.achieve.org/node/333

ACT. (1999). *Relationships between the noncognitive characteristic, high school course work and grades, and test scores for ACT-tested students*. Retrieved from http://www.act.org/research/researchers/reports/pdf/ACT_RR99-04.pdf

ACT. (2007). *ACT technical annual*. Iowa City, IA: ACT, Inc.

ACT. (2008a). *The relative predictive validity of ACT scores and high school grades in making college admission decisions*. Retrieved from http://www.act.org/research/policymakers/pdf/PredictiveValidity.pdf

ACT. (2008b). *Average ACT scores by state*. Retrieved from http://www.act.org/news/data/08/states.html

ACT. (2009). *Using ACT data as part of a state accountability system*. Retrieved from http://www.act.org/research/policymakers/pdf/AccountabilityMeasures.pdf

ACT. (2010). *The condition of college and career readiness 2010*. Retrieved from http://www.act.org/research/policymakers/cccr10/about.html

ACT. (2011a). *ACT national and state scores 2011 national score trends*. Retrieved from http://www.act.org/newsroom/data/2011/trends-text.html#one

ACT. (2011b) *The condition of college &career readiness 2011*. Retrieved from

    http://www.act.org/research/policymakers/cccr11/pdf/ConditionofCollegeandCare

    erReadiness2011.pdf

ACT. (2011c). *The condition of college and career readiness 2011 Arkansas*. Retrieved

    from http://www.act.org/newsroom/data/2011/states/pdf/Arkansas.pdf

ACT. (2011d). *ACT profile report- state graduating class 2011 Arkansas*. Retrieved from

    http://www.act.org/newsroom/data/2011/pdf/profile/Arkansas.pdf

ACT. (2012a). *Educational/career aspirations & economic development*. Retrieved from

    http://www.act.org/research/policymakers/cccr11/pdf/CareerInterestsProjectedJob

    Openings.pdf

ACT. (2012b). *History of ACT.* Retrieved from http://www.act.org/aboutact/history.html

Arkansas Department of Education. (2005). *2005 letter to parents.* Retrieved

    http://arkansased.org/testing/pdf/letter2parents_v2.pdf

Arkansas Department of Education. (2007). *Performance report.* Retrieved from

    http://www.arkansased.org/performance_report/pdf/understand2007.pdf

Arkansas Department of Education. (2008). *Assessment overview.* Retrieved from

    http://arkansased.org/testing/pdf/assessment_overview_031408.pdf

Arkansas Department of Education. (2009). *AYP and student assessment.* Retrieved from

    http://arkansased.org/educators/pdf/ayp_assessment_080509.pdf

Arkansas Department of Education. (2010a). *ACTAPP spring 11th grade literacy testing*

    manual. Retrieved from http://arkansased.org/testing/pdf/assessment/

    tam_lit_012511.pdf

Arkansas Department of Education. (2010b). *ACTAPP spring algebra I end of course testing manual*. Retrieved from http://arkansased.org/testing/pdf/ assessment/tam_algI_spr_020911.pdf

Arkansas Department of Education. (2010c). *ACTAPP spring benchmark testing manual*. Retrieved from http://arkansased.org/testing/pdf/assessment/ tam_benchmarkgr3468_021411.pdf

Arkansas Department of Education. (2010d). *ACTAPP spring biology literacy testing manual*. Retrieved from http://arkansased.org/testing/pdf/ assessment/tam_bio_spr_020911.pdf

Arkansas Department of Education. (2010e). *ACTAPP spring geometry end of course testing manual*. Retrieved from http://arkansased.org/testing/pdf/ assessment/tam_geo_spr_020911.pdf

Arkansas Department of Education. (2010f). *Testing definitions*. Retrieved from Arkansas Department of Education website: http://www.arkansased.org/ testing/definitions.html

Arkansas Department of Education. (2012). *Testing and student assessment*. Retrieved from http://arkansased.org/testing/assessment.html

Arkansas Department of Higher Education. (2009). *Comprehensive Arkansas higher education annual report: Student remediation*. Retrieved from http://www.adhe.edu/

Arkansas Economic Development Commission. (2009). *Governor Mike Beebe's strategic plan for economic development*. Retrieved from http://arkansasedc.com/

Arkansas Higher Education Coordinating Board. (2009). *Regular quarterly meeting*.

   Retrieved from http://www.adhe.edu

Arkansas Task Force on Higher Education Remediation, Retention, and Graduation

   Rates. (2008). *Access to success*. Retrieved from http://www.adhe.edu

Astin, A. (1993). *What matters in college?* Retrieved from

   www.cudrlstudentstaff.pbworks.com

Bailie, C. (2011). *The 21st century classroom: Integrating educational technology with*

   21st century competencies in support of workforce development. Retrieved from

   http://repositories.lib.utexas.edu

Bishop, J. H. (2004). Money and motivation [Electronic version]. *Education Next*, *4*(1),

   62-67.

Center for Education Policy. (2010). *Arkansas state profile Arkansas comprehensive*

   assessment program. (ERIC Document Reproduction Service No.ED514563).

Cloud, J. (1997, November 10). *Race in America: What does sat stand for? Why an end*

   to affirmative action might doom a rite of passage that every high-schooler fears.

   Retrieved from http://content.time.com

Cortez, A. (1997). *Criteria for diversity: THECB's advisory committee suggests new*

   criteria. Retrieved from http://www.idra.org

Cross, T., & Slater, R. B. (1997). Why the end of affirmative action would exclude all but

   a very few Blacks from America's leading universities and graduate schools.

   Journal of Blacks in Higher Education, *17*, 8-17.

Duncan, A. (2011). *Reforming NCLB requires flexibility and accountability*. Retrieved

 from http://www.ed.gov/blog/2011/10/reforming-nclb-requires-flexibility-and-

 accountability/

Fulton, M. (2010). *Getting past go: State reports on the cost of remedial education.*

 Retrieved from http://www.gettingpastgo.org/docs/CostofRemedialEducation-

 StateReports.pdf

Glaser, R. (1963). Instructional technology and the measurement of learning outcomes:

 Some questions. *American Psychologist*, *187*, 519-521.

Glaser, R., & Nitko, A. (1971). Measurement in learning and instruction. *Educational*

 Measurement [Electronic version], *2*. Retrieved from

 http://www.eric.ed.gov/ERICDocs/dataericdocs2sql/content_storage_01/0000019

 b/80/32/59/de.pdf

Greene, J. P. A. (2006). Comprehensive problem [Electronic version]. *Education Next*,

 6(1), 23-26.

Griesemer, N. (2012). *College explorations: Discovering the right college for you!*

 Retrieved from http://collegeexplorations.blogspot.com/2011/09/colleges-that-

 superscore-act.html

Hebel, S. (1999, February 12). Minority students sue Berkeley, charging bias in

 admissions. *The Chronicle of Higher Education*, pp. A37.

Heubert, P, & Hauser M. (1999). *High stakes: Testing for tracking, promotion, and*

 graduation. Retrieved from http://books.google.com

Jeffrey, P. (2012). *When should girls basketball players take the ACT or SAT test?*

 Retrieved from http://ezinearticles.com (ID 1255146)

Kiplinger, V. L. (1997). *Standard-setting procedures for the specification of performance levels on a standards-based assessment*. Retrieved from http://arkansased.org/testing/pdf/colorado_standards.pdf

Lotkowski, V., Robbins, S., Noeth, R. (2004). *The role of academic and non-academic factors in improving college retention*. Retrieved from http://www.act.org/research/policymakers/pdf/college_retention.pdf

McKim, B. (2007). The road less traveled. *Phi Delta Kappan*, *89*(4), 298-299.

Marklein, M. B. (2000). GPA jumps to head of class. *USA Today*, p. D10.

Mertler, C. A., & Vannatta, R. A. (2010). *Advanced and multivariate statistical methods*. (4th ed.). Glendale, CA: Pyrczak.

Millman, J. (1994). Criterion-referenced testing 30 years later: Promise broken, promise kept. *Educational Measurement: Issues and Practice, 13*(4), 15-18.

National Council of Measurement in Education. (2007, March). *Setting performance standards for school accountability programs: Policy, technical, and operational issues*. Paper presented at the 2008 Annual Meeting of the National Council of Measurement in Education, New York City, NY.

No Child Left Behind (NCLB) Act of 2001. Pub. L. No. 107-110, § 115, Stat. 1425 (2002).

Noble, J. (2003). *The effects of using ACT composite score and high school average on college admission decisions for racial/ethnic groups*. Retrieved from http://inpathways.net/ACT_RR2003-1.pdf

Noble, J., & McNabb, T. (1989). *Differential coursework and grades in high school: Implications for performance on the ACT Assessment.* (ACT Research Report. 89-5). Iowa City, IA: ACT.

Pershey, M (2010). *A comparison of African American students' self-perceptions of school competence with their performance on state-mandated achievement test and normed test of oral and written language and reading*. Retrieved from http://nexus.harding.edu:2054/ehost/pdfviewer/pdfviewer?vid=4&hid=113&sid=7 e6d315d-aa34-4018-b0fe-ffd5365f11bc%40sessionmgr111

Peterson, P. E. (2003). Ticket to nowhere [Electronic version]. *Education Next*, *3*(2), 39-46.

Sandler, D. (1987). Specifying and promulgating achievement standards, *Oxford Review of Education, 13*(2), 191- 209.

Sizmer, S., & Sainsbury, M. (1997). Criterion referencing and the meaning of national curriculum assessment. *British Journal of Educational Studies, 45*(2), 123-140.

Southern Regional Education Board. (2010). *Arkansas moving ahead*. Retrieved from http://publications.sreb.org/2010/Arkansas2010.pdf

Springer, M. G. (2008). Accountability incentives [Electronic version]. *Education Next*, *6*(1), 74-79.

St. John, E. P., Simmons, A. B., & Musoba, G. D. (1999). *Merit-aware admissions in public universities: Increasing diversity* [Policy Bulletin]. Indianapolis, IN: Indiana Education Policy Center.

Tucker, B. (2011, October). The truth about testing costs [Electronic version]. *Education Week, 31*(7).

United States Department of Education. (2004). *Four pillars of NCLB*. Retrieved from

      http://www.ed.gov/nclb/overview/intro/4pillars.html

United States Department of Education. (2007). *State and local implementation of the No*

      Child Left Behind Act volume III-accountability under NCLB: Interim report.

      Retrieved from http://www.ed.gov/rschstat/eval/disadv/nclb-accountability/nclb-

      accountability.pdf

United States Department of Education. (2010a). *A blue print for reform*. Retrieved from

      http://www2.ed.gov/policy/elsec/leg/blueprint/blueprint.pdf

United States Department of Education. (2010b). *No Child Left Behind Act*. Retrieved

      from http://www2.ed.gov/policy/elsec/leg/esea02/beginning.html

United States Department of Education. (2011). *No Child Left Behind Act*. Retrieved

      from http://www2.ed.gov/policy/elsec/leg/esea02/beginning.html#sec4

Winston, D. (2008). The right Republican strategy [Electronic version]. *Education Next*,

      8(1), 61-65.

Wiley (2012). *Getting your act together: ACT 101*. Retrieved from

      http://media.wiley.com/product_data/excerpt/93/11180125/1118012593-36.pdf

Willingham, W., Lewis, C., Morgan, R., & Ramist, L. (1990). *Predicting college grades*

      analysis of institutional trends over two decades. Princeton, NJ: Educational

      Testing Service.

APPENDIX

APPENDIX A

Status of Request for Exemption from IRB Review
(For Board Use Only)

Date: June 1, 2011

Proposal Number: 2011-41

Title of Project: Predictive Effects of Various Factors on Academic Achievement
Measured by the American College Test (ACT)

Principal Investigator(s): Elizabeth Stewart estewar1@harding.edu

■ Research exempted from IRB review.

☐ Research requires IRB review.

☐ More information is needed before a determination can be made. (See attachment.)

I have reviewed the proposal referenced above and have rendered the decision noted above.
This study has been found to fall under the following exemption(s):

☐ 1   ☐ 2   ☐ 3   ■ 4   ☐ 5   ☐ 6

In the event that, after this exemption is granted, this research proposal is changed, it may require a review by the full IRB. In such case, a **Request for Amendment to Approved Research** form must be completed and submitted.

This exemption is granted for one year from the date of this letter. Renewals will need to be reviewed and granted before expiration.

The IRB reserves the right to observe, review and evaluate this study and its procedures during the course of the study.

(signature)

Chair, Harding University Institutional Review Board