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The effect of selected student profile variables in the 2005 American College Test (ACT) on academic performance of Mississippi high school graduates as measured by the sub-scales in the ACT

Gregory Demond Stephens

THE EFFECT OF SELECTED STUDENT PROFILE VARIABLES IN THE 2005 AMERICAN COLLEGE TEST (ACT) ON ACADEMIC PERFORMANCE OF MISSISSIPPI HIGH SCHOOL GRADUATES AS MEASURED BY THE SUB-SCALES IN THE ACT

By

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The purpose of this study was to examine the effect of selected student profile variables in the 2005 American College Test (ACT) on academic performance of Mississippi high school graduates as measured by the subscales in the ACT. The sample consisted of 16,779 high school graduates that completed the ACT in Mississippi in 2005.

The variables that were studied were the ACT subscores: English, mathematics, reading, and science reasoning subscales; race/ethnicity, size of graduating high school class, high school curriculum, and gender, which were completed on the student profile section when the student registered for the ACT.

Analysis of variance (ANOVA) and multiple regression analysis at the .05 alpha level, and Means were used to test the statistical significance of the effect of each variable on the ACT subscores.

The findings resulted in a statistically significant difference occurring in all four predictor variables: race/ethnicity, size of graduating high school class, high school curriculum, and gender; except no statistically significant difference in gender in the ACT subscore of English and reading. Only two variables explained 40% of the variance of the English ACT subscore: race and ethnicity, and class size. Three variables explained 52% of the variance of the math ACT subscore: (a) race and ethnicity, (b) class size, and (c) gender. All four variables explained 36 % of the variance of the science reasoning ACT subscore.

The conclusions drawn from this study were that there were statistically significant differences in the ACT subscore means among the different racial and ethnic groups of students. The mean scores were the lowest for the race and ethnicity variable in the African American background. The lowest ACT subscore mean was in the 399 or below class size, and the highest ACT subscore mean was in the 900 or more class size. The college preparatory program of study scored higher mean scores than the lower ranking other or general and business/vocational program of study, respectively. Overall, males scored higher on the ACT subscores than the females with females outranking males in English. These were found to be probable predictors of success on the ACT.

DEDICATION

I dedicate this research to my late grandmother Mrs. Erma B. Mosley and my great aunt Ms. Archie Beasley who were both longtime educators that taught me the value of education at a very young age by being role models through their many selfless acts and teaching the many children they educated.

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Last and certainly not least, I would like to thank Ms. Wendy Hubbard, a talented young lady, for her help with this project and encouraging words. To the countless names of others whom I failed to mention that have said a prayer or encouraged me along this journey, I would like to say thank you as well.

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CHAPTER I

INTRODUCTION

Over the years education has undergone many changes. The demand on our students requires a higher level of skill and knowledge than the industrial economy that was geared toward factory production. Individuals should be able to reason and solve complex problems as well gather and synthesize information. Because of these factors, student achievement and performance must be able to rise as well (Leibbrand, 2000)

The poor performance of school districts as defined by the Nation's Report Card on Assessment prompted President Bush to sign the No Child Left Behind Act with the intent of helping promote success for all. The No Child Left Behind Act (NCLB) is attempting to repair the problem of inadequate education and change the federal government's role in K-12 education by asking America's schools to describe their success in terms of what each student accomplishes (Amrein & Berliner, 2003).

Tests have always been used in the classroom to monitor and track students' progress. Standardized achievement tests, in particular, have been part of school monitoring systems for many years. Reforms in education have caused standardized tests to be used at major transition points such as from high school to college (Shannon, 1992). In Mississippi, the major transition standardized test is the American College Test (ACT).

The ACT, produced by the Educational Testing Services, is a major test that is used in the admission process for gaining entrance into institutions of higher learning. The ACT assesses the areas of English, mathematics, reading, and science reasoning. The composite scores range from 1 to 36. The ACT assessment is intended to aid college admissions and course placement decisions while measuring academic skills and knowledge that is supposedly taught in college preparatory curriculum in high school.

When examining ACT mean composite scores of students, the Student Profile Section variables should be taken into account with the score if the variables are found to be a determining factor. This researcher chose several of these variables such as students in varying class sizes, students that were enrolled in different curricula, and students of different gender or race and ethnicity to try and establish if there are differences in the outcome of the ACT mean composite scores and the different variables.

Statement of the Problem

There is a debate over the significance placed on the outcome of the ACT by post-secondary institutions of Mississippi (Smith, 1995). Which variables, if any, produce gaps in ACT sub-scale scores between various populations of high school students in Mississippi? The problem of this study is to determine the effects, if any, of selected variables in the Student Profile Section on Mississippi high school student achievement as measured by the ACT assessment sub-scale scores. The selected variables used as the independent variables were: (a) race or ethnicity, (b) gender, (c) class size, and (d) high school curriculum. The literature reviewed by this researcher revealed no recent studies

for the state of Mississippi have been done involving the effects of certain variables on the ACT.

Even though the minimum score for entrance can vary from one state-supported university to the next in Mississippi, they all require applicants to provide a test score. The ACT is designed to assess high school students' general educational development and their ability to complete college-level work (Smith, 1995).

Research Questions

The following research questions guided this study:

1. Is there a statistically significant difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students), who graduated from schools with very large graduating class sizes (900 or more students), large graduating class sizes (600-899), medium graduating class sizes (400 to 599 students), and small graduating class sizes (399 or fewer students) in Mississippi? The dependent variables are the ACT mathematics, English, reading, and science reasoning sub-scale scores.
2. Is there a statistically significant difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students) and class size (very large, large, medium, and small), who completed high school curriculum program courses in business or commercial,

vocational-occupational, college preparatory, and other general programs in Mississippi? The dependent variables are the ACT mathematics, English, reading, and science reasoning sub-scale scores.

3. Is there a statistically significant difference in mean 2005 ACT sub-scale scores between males and females, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students) and class size (very large, large, medium, and small), in Mississippi? The dependent variables are the ACT mathematics, English, reading, and science reasoning sub-scale scores.
4. Which demographic variables in the 2005 ACT Student Profile Section, (a) gender, (b) race and ethnicity, (c) class size, and (d) high school curriculum are the best predictors of mean 2005 ACT sub-scale scores of the high school graduates?

Purpose of the Study

The number of students that completed the ACT in 2005 is 16,779 (ACT, Inc., 2006). As noted earlier in this chapter, Smith (1995) noted a debate over the significance placed on the outcome of the ACT by post-secondary institutions of Mississippi. Boyer (1986) stated that tests should be abandoned since only a few of the very selective colleges place weight on the scores for admission, while others require tests to be taken without regard to the score. The ACT is the most commonly used college entrance examination in the state of Mississippi. This study sought to provide the most current research involving the use of the ACT in the admissions process for Mississippi.

Significance of the Study

The ACT assessment program is a comprehensive evaluation, guidance, and placement service that students and educators use during the transition from high school to college. According to American School Board Journal (2005), students and parents need to be made aware of the validity of the ACT scores on predicting their success in college and how the college is going to review the scores for admission purposes. The results of this study may also aid policy makers as they view institutions of higher learning in Mississippi's admission requirements and how policy impacts student enrollment in this state.

Limitations

The data for this study is limited to the population of 16,779 Mississippi high school students who participated in the 2005 ACT Assessment Program. Thus, these particular findings cannot be generalized to students in Mississippi other than those who took the test in the 2005; the student profile section of the ACT registration folder, a self-reporting instrument, was used as part of the research database, which requires the acceptance of a self-answering report; and the research design is causal-comparative.

Delimitations

This study focused on selected variables of the ACT Student Profile Section: students in varying class sizes, students that were enrolled in college preparatory courses versus non-college preparatory courses, and students of different gender or race and

ethnicity. This study only focused on 16,779 high school students in Mississippi who completed the ACT in 2005.

Definitions of Terms

For the purpose of this study, the following operational definitions were used:

ACT - The American College Test assessment examination has four academic subtests: English, mathematics, reading, and science reasoning.

ACT Student Profile Section - Survey of students on various personal and educational characteristics upon completion of the ACT test registration folder.

Enhanced ACT scores - The enhanced or core scores of the test in the areas of English, math, reading, science reasoning.

High School College Preparatory Curriculum - A high school college preparatory curriculum is defined as a program including: social studies (three years or more)- one year credit each for American history, world history, American government; one-half year credit each for economics, geography, psychology, other history (European, state, etc.); English (four years or more)- one year credit each for English 9, English 10, English 11, and English 12; Natural Sciences (three years or more)- One year credit each for general/physical/earth science, biology, chemistry, physics; and mathematics (three years or more) – one year credit each for algebra I, algebra II, geometry; one-half year credit each for trigonometry, calculus (not pre-calculus), other math courses beyond algebra II, computer math/computer science.

Non-College Preparatory Curriculum - A high school curriculum that consists of fewer courses than those included in the high school college preparatory curriculum.

Summary

Chapter One states the problem and reasons for conducting this research. The questions, purpose, limitations, delimitations and definition of terms for this research are offered. The literature involving information on every variable, relating factors and variables, and the usability of standardized test and the ACT are reviewed in the second chapter. Chapter Three includes the design, sample, data collection, instrumentation, and analyses that were used. Chapter Four includes the analysis and tests of the data that answer the research questions. Chapter Five summarizes, offers conclusions, and makes recommendations for further research.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Many studies such as Shannon (1992), Levy (2001), Smith (1995), and Pappas (1990) have been conducted on standardized tests such as the ACT over the last few decades. This study investigated the effects of several selected variables on high school student achievement in Mississippi as measured by the ACT assessment scores. The importance of the ACT is stressed in this study because it is the entrance examination for all of Mississippi's state supported universities even though controversy may exist over the use of the ACT. Colleges and universities continue to use it in the admission process as well as awarding financial aid and scholarships (Smith, 1995).

In this chapter, the history of the ACT, uses of the ACT as a predictor of college success, and measure and evaluation of standardized tests are discussed to define how the test came about and the importance of tests and the ACT in education today. The research on the selected variables are presented as a reference of previous findings.

Historical Perspective of the ACT

The history of the American College Test (ACT), as a national assessment, begins with the development in Iowa City, IA. The test was created to assess the aptitudes and

abilities of high school students. This test is especially important to students who desire to attend a post-secondary institution of higher learning. It is a comprehensive, guidance, and placement test for educators and students in the transition from high school to college (Pappas, 1990).

The development of this test actually occurred in 1959 when E. F. Lindquist created the ACT with the belief that college entrance examination should be used to directly measure examinees' abilities to complete the tasks required for college. Lindquist believed the ACT should be a test of achievement. Examinees should be able to use their acquired skills and knowledge to complete these tasks successfully on this well designed test (Smith, 1995).

The ACT added the Student Profile Section (SPS) and interest inventory in 1985 to determine exactly who was taking the test. Later that same year, ACT added the High School Course/Grade Information section which questions students on grades he/she has earned on high school courses taken and classes that the student plans on taking in the future (Laing, Engen, & Maxey, 1986). Along with the composite scores, the information for this study are drawn from these sections.

According to the ACT Assessment Technical Manual (1997), students typically complete the ACT their junior or senior year because the post-secondary work usually begins right after graduation. This means that most of the students take the test while they are between the ages of sixteen and twenty. Most of the work is completed by the spring of the junior year in high school so a student is ready to take the test then, but each student varies in preparedness. The Technical Manual also states that the South is one of

three regions that is over-represented when compared to the statistics of college-bound students nationally that complete the ACT.

The ACT was once not as revered in the admission process as greatly as it is now in the South. In 1975, Jake Ayers sued the Institute of Higher Learning (IHL) of Mississippi alleging that since the ACT played such a vital role in the admission process of the universities of this state, it had an adverse effect upon minority student admission to IHL. It was also alleged that unequal admission standards requiring higher ACT scores at white universities versus those at historically black colleges and universities had a negative and discriminatory effect on black students. The plaintiffs in this case also contended that test scores should be the least of all variables used to determine a student's readiness as they enter college (Smith, 1995).

In this case, Judge Neal Biggers, presiding judge, ruled that undergraduate admission policies were vestiges of de jure segregation that continue to have segregation effects. Beginning in the summer of 1995, Judge Biggers ruled that the state college board must have a statewide admission policy for all state supported universities for the 1995-96 school year (Levy, 2001). Mississippi officials are trying to find closure to the Ayer's case by studying how other states resolve their higher education desegregation lawsuits (Kanengiser, 2000). One way Mississippi is trying to do this is by trying to fund all eight state universities equally.

Use of ACT as a Predictor of College Success

In July 2003, an article in *U.S. News & World* Report stated that more than ninety percent of colleges and universities require SAT or ACT scores. The National

Association for College Admission Counseling stated that 52 percent of college staff that screened applications for admission indicated that student scores were important. Passing the test is only a goal worth reaching if the test itself is actually used in the fulfillment of admission requirements to college (Black, 2005). Stumpf and Stanley (2002) found there are at least three reasons why the ACT may not be a direct correlation of a student's progress. The first is that the admission officers try to make efforts to admit only the students that have a successful outlook toward actually graduating from college. The exceptions to this are the major sports athletes, minorities that need to be better represented, and the alumni descendants. This means that the predictive value of the test is already used. The second reason is the admission officers of selective and moderately selective colleges sometimes do not admit students with both a low score on the ACT and low scores on high school class work. Most of the students with a high ACT score and high GPA in high school are admitted, as well as, students with either a high ACT and low high school GPA or a low ACT and a high GPA. However, this means the value of one depends on the value of the other. This brings up the third reason which states that it is hard to believe that ACT scores and high school GPAs could even be compared across a freshman class because most of the students will not take the same classes. Some classes are graded harsher than others, so the ability to complete one is not the same ability needed to complete another (p.1043)

The analyses of ACT scores show that students are not ready for the first year of mathematics and science in college. This analysis is helpful to teachers and administrators in high schools. Although over half the students were ready for college

classes, less than fifty percent were ready in mathematics and science. At a press release, former Secretary Paige (2004) states ACT conducted a study that found less than 25 percent of seniors that took the ACT were prepared for the same subject areas in college. African Americans are among the minorities that will more than likely graduate from high school without attaining the appropriate schooling. Yet, others find the scores are not as important as they are noted to be. Robert Schaeffer of FairTest, testing reform advocacy organization, said "the ACT and the College Board—both nonprofit organizations—behave much like free-market competitors, hunting for attention-grabbing news angles to get better coverage for their products" (Colgan, 2003).

Sheldon and Biddle (1998) conducted studies and found there is a negative correlation between these high stake tests and student achievement. Also, there was a comparison between achievement levels on state tests and national assessments and showed that the students did better on state tests than national assessments. If a student is not driven to achieve high academic standards then it is highly plausible that they will not want to become lifelong learners.

According to *One-Third of a Nation Report,* skills needed to achieve in school are also needed to complete school. ETS Policy Information Center Report compared research on school achievement. Some of the fourteen comparisons included low birth weight, being read to by parents, watching TV in certain patterns, teacher qualifications and student's behavior in school. Achieving in school is strongly related to completing school, and poor performers tend not to complete (Barton, 2005).

Measure and Evaluation of Standardized Tests

When a test is evaluated, three criteria need to be addressed which are validity, usability, and reliability. If these criteria are present, then there is a good possibility that bias does not exist (Lyman, 1998). Validity refers to the ability of the test to do what is meant to accomplish. Reliability refers to a test having consistent or dependable scores. Usability takes into account factors such as cost, ease of scores, and time required administering the assessment (Lyman, 1998).

In 1999, Heubert and Hauser used criteria developed from earlier work of the National Research Council and identified three principal criteria for determining whether a test's use is appropriate. The principal criteria identified were (1) measurement validity-whether a test is valid for a particular purpose and whether it accurately measures the test takers knowledge in the content area being tested; (2) attribution of cause-whether a student's performance is indicative of the instruction received or is it indicative to poor instruction or such factors as language barriers or disabilities unrelated to the skills received; and (3) effectiveness of treatment- views test scores and whether or not decisions based on these test scores can be beneficial.

Even though the previously mentioned criteria, which are based on professional standards, exist, these principles lead to four basic principles of appropriate test use for educational decisions: (1) the most important element of a test is not the validity, per se, but rather the validity when it is used for a specific purpose. This means that tests are valid for a variety of things such as influencing classroom practice or holding schools accountable and leading the curriculum. These tests are not valid for making high stakes

decision about student's mastery about a particular area unless the teaching, tests, and curriculum are aligned. (2) The questions on the tests are just a sample of any number of questions that could be asked at any given area; therefore, tests are not perfect. Because a student's test score is not an exact measure, the scores can be expected to vary depending on the type of test given within a margin of error determined by the reliability of the test. As a result of this, no single test score can be considered a definitive measure of student skill and knowledge; (3) A single test score should not be the basis for making an educational decision solely or automatically in regards to the test taker. Other relevant information about the student's knowledge and skills also should be taken into account; (4) Test scores or any other type of information can justify bad decisions. Students are typically hurt by retention in school without remedial or other instructional support services. Better tests will not lead to better outcomes in the absence of effective service for low performing students (Heubert & Hauser, 1999). Several colleges have questioned the validity of the entrance examinations as instruments for selection (Smith, 1995).

For this study, the accuracy of student responses on the ACT Student Response section need to be validated to see if decisions involving this section increase achievement (Smith, 1995). Analysis of the relationship between high school transcripts and self-reported course grades on the ACT Interest Inventory/Student Profile Section by the ACT has occurred for many years (Schiel & Noble, 1991). Reporting by the students has been found to have a strong relationship with the scores on the high school transcripts. The correlations between the two ranged from .80 (Sawyer, Laing, &

Houston, 1988) to .91 or .93 (Davidsen, 1963; Richards, Holland, & Lutz, 1966; Valiga, 1986).

This study pertaining to the 1985-1986 school year involved 1,074 students from 53 high schools randomly selected across the United States. Data for these students were gathered from the High School Course/Grade Information Section (CGIS) of the ACT Assessment folder to find if the courses taken/planned and grades received on such courses were accurately reported compared to high school transcripts. The study found 10 percent of students provided no information, 87 percent who said they had taken the classes were actually correct, and 3 percent were not accurate as transcripts reported. When analyzing these findings, the non-reporters were actually correct in that none of the courses were taken, 71 percent of the ones that reported coincided with transcripts and 97 percent were within one letter grade of actual grade on transcript. From this, the study concluded the CGIS could be used when making decisions except for major decision such as admission into college and scholarship. For these decisions, high school transcripts should be consulted for accuracy (Sawyer, Laing, & Houston, 1988).

The ACT is a test of a person's educational development and quantity of information learned (McManus, 1991). Needs of students and future educational plans are attempted to be met by institutions because of the data collected by the American College Assessment program. When using only the ACT in placement decision, factors such as high school grades and work, local placement tests, and other non-academic skills should be considered (ACT, 1997). Mortante (1987) conducted a study that also found tests are important in placement when used with other background information. Another

finding was that colleges have used placement tests for many years even though declining proficiencies have constantly occurred in students over the past twenty years.

Students and parents should be informed of the low predictive value of these tests and how different colleges use the score of the test. Factors such as attendance, grades, work experiences, and volunteering in the community should also be stressed to the students rather than placing the fate of the future on the test score. ACT advises students, in one of their reports, that the more challenging the courses taken in high school the more ready the student will be for college and for completing a degree (Black, 2005).

The Effects of Graduating Class Size on Student Test Achievement

One factor that affects student test achievement is the size of the graduating class. An Organization for Economic Co-Operation and Development Report in 2004 states that the United States is still in tenth place internationally in graduation rates, but the number of dropouts is greatly skewed by the amount of students receiving their General Education Development Certificate (GED) (Fuller, 2004). The Greene Report (Greene and Foster, 2002) states that of the graduates, seventy-two percent are white, fifty-one percent are black, fifty-four percent are American Indian and seventy percent are Asian.

The dropout rate of Mississippi is declining, but it is still among the highest rates in the United States (Byrd, 2005). Cecil Brown, House of Education Committee Chairman (2005), said even though the national dropout is twenty-five percent, Mississippi's dropout rate is forty percent.

A small class size will result in a low ACT score use to be the thinking in higher education (Edington, 1981). Chambers (1988) found students attending smaller high

schools did score lower on the ACT. Amos and Moody (1981) studied achievement of fourth and eighth grade students in Mississippi to see if there was any correlation to the school district size. Mathematic scores seemed to be the only area in which there was a negative correlation. Positive correlations were found in English and reading. Caston (1989) conducted another study in Mississippi and found that the mean achievement levels for the students in the municipal school districts (generally inside the city limits) were higher than the levels of the consolidated school districts (where two or more schools are combined) on the Basic Skills Assessment Program (BSAP) in 154 school districts.

The Effects of Completing a College Preparatory Curriculum versus a Non-College Preparatory Curriculum in High School

The ACT assessment is intended to aid college admissions and course placement decisions while measuring academic skills and knowledge that is supposedly taught in college preparatory curriculum in high school. If ACT assessment scores are legitimate, then those taking college preparatory courses will achieve higher ACT scores versus those who do not take college preparatory courses. According to *College Hopefuls: Ready or Not?* (2003), ACT surveyed college bound seniors and found forty percent did not take the needed college preparatory courses. Also, students with higher ACT scores should be more successful than those students with lower ACT scores. Some standardized tests reflect differences of high school students such as courses taken, grades earned, high school ranking, and quality of education received (Zwick, 1999).

According to Black (2005), alternative variables have also been found that add to scoring high grades in high school, as well as, helping the students succeed on the ACT and in college. Some of the qualities are the own student's diligence to do his/her work, intrinsic motivation to study, and meeting challenges with hard work. Taking challenging courses in high school though helps show the hard work and effort put into schooling, which in turn increases test scores and the ability to get into better colleges. Colleges tend to look past the easy A's to the well-earned A. Since the ACT is to test high school skills, the more challenging the class the more ready the student will already be for the ACT and college. Completing courses along with participating in extracurricular activities, having written recommendations, personal essays, and a productive interview are great predictors of a successful college experience.

In addition, educational stakeholders feel it is time to hold students to the same achievement standards regardless of race, socioeconomic status, or where school is attended. The highest performing school systems around the world use this formula of common standards and assessments. Students in these countries routinely outperform United States students on international assessments, not because they have more talent, but because their schools expect more from them. Too many students graduate from high school unprepared for the challenges ahead. Increasing numbers of students at four-year colleges need remedial education in reading, writing, and mathematics. Employers report that thirty-four percent of job applicants tested by major U. S. firms in 2001 lacked sufficient reading and mathematics skills to do the jobs they sought (Gandal & McGiffert, 2003).

To keep with the theme of expecting more and better from the students and schools, Mississippi has increased the expectations for graduating seniors in the state. Crisp (2005) reported that high school seniors who wanted to attend a Mississippi university must earn an extra unit of mathematics, science and social studies beginning in 2010. Before this requirement, students were allowed to take an extra science or math as their advanced elective credit. As a result of this change, foreign language and advanced world geography will be redefined as advanced electives.

Currently, in Mississippi, each student graduating from a secondary school in an accredited school district must have earned a minimum of twenty Carnegie units. The senior class requirements for the 2002-2003 ninth graders include four units of English, three units of mathematics, three units of science, three units of social studies, half a unit in health, one unit in business and technology, one unit in the arts, and four and a half elective units. Compensatory Reading and Compensatory Writing courses may not be included in the four English courses required for graduation, however, these courses may be included in the 4½ general electives required for graduation. Compensatory Mathematics and any developmental mathematics course may not be included in the three mathematics courses required for graduation; however, these courses may be included in the 4½ general electives required for graduation. At least one of the three required mathematics courses must be higher than Algebra I. The allowable mathematics courses that can be taken which are higher than Algebra I are: Geometry, Algebra II, Advanced Algebra, Trigonometry, Pre-Calculus, Calculus, AP Calculus AB, AP Calculus BC, Discrete Mathematics, Probability and Statistics, and AP Statistics. One unit may be in

Technology Applications or Introduction to Agriscience or Agriscience I or Concepts of Agriscience or Allied Health or Aquaculture. The credit earned for a State/Local Government course in any other state by an out-of-state transfer student who enters after the sophomore year can stand in lieu of Mississippi Studies or Mississippi State and Local Government. One unit in Computer Discovery is accepted in lieu of the two- ½ unit courses. Evidence of proficiency in Keyboarding and Computer Applications is accepted in lieu of the required courses if the student earns one unit in any of the courses listed in the *Business and Technology Framework* (academic and vocational). Elective units in physical education include participation in interscholastic athletic activities that meet the instructional requirements specified in the *Fitness through Physical Education Framework* and that are sanctioned by the Mississippi High School Activities Association (www.mde.k12.ms.us).

For the future students of Mississippi, each student graduating from a secondary school in an accredited school district must have earned a minimum of 21 Carnegie units. The senior class requirements for the 2004-2005 eighth graders include four units of English, four units of mathematics, three units of science, three units of social studies, half a unit in health, one unit in business and technology, one unit in the arts, and four and a half elective units. Beginning school year with the eighth graders of 2004-2005, Pre-Algebra and Transition to Algebra, as well as Algebra I, may be taken in the eighth grade for Carnegie unit credit. Survey of Mathematical Topics, Compensatory Mathematics and any developmental mathematics course may not be included in the four mathematics courses required for graduation, however, these courses may be included in

the 4.5 general electives required for graduation. At least one of the four required mathematics courses must be higher than Algebra I. The allowable mathematics courses that can be taken which are higher than Algebra I are: Geometry, Algebra II, Advanced Algebra, Trigonometry, Pre-Calculus, Calculus, AP Calculus AB, AP Calculus BC, Discrete Mathematics, Probability and Statistics, and AP Statistics (www.mde.k12.ms.us).

The State College Board of the Institutions of Higher Learning (IHL) has also identified required courses for admission to public, state supported universities in Mississippi. It should be noted the IHL requirements for admission to public universities are different from state high school graduation requirements. IHL admission requirements list the specific courses for admission. The courses include four units of English; three units of mathematics that include algebra I, geometry, and algebra II ; three units of science (two lab- based) from the following list: biology, advanced biology, chemistry, advanced chemistry, physics, advanced physics, physical science; three units of social studies which include U.S. history, world history, U.S. Government, economics or geography; one-half unit in computer applications; and two units from the advanced electives that include foreign language, world geography, fourth-year lab-based science, or fourth-year mathematics (www.ihl.edu).

Students must complete the college prep curriculum and meet admission standards to enter a Mississippi public university. Pennington (2005) states the admission standards to Mississippi public university are as follows: (1) All students completing the College Prep Curriculum (CPC) with a minimum of a 3.20 high school GPA on the CPC,

or (2) All students completing the CPC with (a) a minimum of a 2.5 high school GPA on the CPC or a class rank in the top 50%, and (b) a score of 16 or higher on the ACT (Composite); or (3) All students completing the CPC with (a) minimum of a 2.00 high school GPA on the CPC and (b) a score of 18 or higher on the ACT (Composite), or (4) All students satisfying the NCAA standards for student-athletes who are *full-qualifiers* under Division I guidelines.

Students who do not meet the requirements above are not eligible for admission to the Mississippi state supported institutions. If the student does not meet the regular admission requirements, the student may attend an on-campus placement process at any university of their choice. The need for summer developmental programs will be identified, or the availability of entering into regular freshman-level classes. Once this has been determined, the student may choose to attend any college of choice in the fall (www.ihl.edu).

The number of students taking the core classes needed for college is down. In 2000, sixty-one percent took the core classes compared to the fifty-six percent of students in 2004 (Raftery, 2004). Former Secretary of Education Rod Paige (2001) stated that the nation has excellent schools and teachers, but there are still students that are falling through the cracks. The National Assessment of Educational Progress (NAEP) surveyed and found only 32 percent of fourth graders are proficient readers on grade level and the numbers are even lower in urban areas which have 26 percent; 36 percent of suburban fourth graders are proficient, as well as, 32 percent of rural fourth graders. This difference also occurs between whites (40 percent) and blacks (12 percent) that are

proficient or above in reading. American high school students also fall behind Cyprus and South Africa on international mathematics tests. The NAEP mathematics test showed that high school seniors scored higher in 1996 than 2000. Eighteen percent of graduates scored below seventeen on the ACT, which means students, need help in basic skills. Even though minority students are taking courses that will prepare them for college, they are still performing lower than the whites on the test. These increased accountability measures in NCLB came about because some of our children were graduating and not having the appropriate skills of reading and mathematics. According to a 1999-2000 report from the National Post Secondary Student Aid Study, it stated that more than a third of college freshmen entered college needing remedial help before they began college coursework (Tabbs, 2005).

Raftery (2004) confirmed these findings. The average ACT score of 2004 was 20.9. This is only one-tenth of a point higher than the average score in 2003. An increase of one-tenth of a point occurred in each subject area on the test. The number of college-preparatory students is declining with the trend, fifty-six percent in 2004 from sixty-one percent in 2000. Students reporting not taking the core classes stayed the same as the number of students not reporting any classes increased. Student who did not take core courses scored 19.4 while students with core classes scored on average of 21.9 on the ACT.

If ACT assessment scores are legitimate, then those taking college preparatory courses will achieve higher ACT scores versus those who do not take college preparatory courses. According to Ezarik (2003), ACT surveyed college bound seniors and found two

out of five did not take the needed college preparatory courses. Also, students with higher ACT scores should be more successful in college courses than those students with lower ACT scores. Some standardized tests reflect differences of high school students such as courses taken, grades earned, high school ranking, and quality of education received (Zwick, 1999).

The Effects of Racial or Ethnic Group Issues on Standardized Tests

Former Secretary of Education Rod Paige (2004) issued a statement on the 2004 ACT results which stated that four out of ten high school graduates are now taking the ACT which is an improvement from previous years. The scores increased in almost all of the ethnic and racial groups. This is the most improvement seen on the test since 1997. However, more help is needed to make the scores adequate to enter college. As noted by Secretary Paige, students who take higher-level classes in high school are earning high scores on the ACT, but the higher-level classes that prepare the students for college class work are being taken by fewer and fewer students.

Concern surrounds the growing dependence, though, on the use of standardized tests to determine educational placement (Gifford, 1992). Minority students are at a disadvantage when colleges use the ACT as a predictor of college success because predictions for minorities and whites are not made fairly (Myers & Pyles, 1992). Predictive validity of grade point averages for black and white students are different according to a study by House (1994). Hispanic and black students were not predicted for success as much as the white students in first year college grades. Knowing this, using just the ACT score has been diminished by the use of ACT scores and high school grades

(Maxey & Sawyer, 1981). In the Ayer's decision, the court ruled the sole use of ACT as the admission standard unlawful because it contributed to Mississippi's dual higher education systems (Biggers, 1995).

The NAACP Legal Defense and Educational Fund examined how well Mississippi's school system was preparing blacks for college admission requirements. This research revealed two important facts. First, blacks that took college prep courses scored higher on the ACT than those blacks that did not. Secondly, students took easier courses that did not prepare them for higher education or higher ACT scores. The findings of the study also revealed a racial gap between black and white students who had taken college prep courses in high school. In most black and high-impoverished school districts, the college prep curriculum was weak. The teachers providing instruction did not have the training to adequately cover the curriculum and the instruction did not cover the entire curriculum (McClure, 1997).

The racial gap in ACT scores has not been closed, which is traceable to the fact that black children start school at a disadvantage because of higher poverty rates and Mississippi's low investment in pre-school and K-12 schooling. Wood (1993) suggests that the cultural test bias hypothesis states negative bias is in the content, procedures, and usage of aptitude tests in minority students.

Using college entrance examinations as major criteria for gaining admission to colleges and universities has raised some questions. Because African Americans have typically scored lower on college-standardized tests, some people believe these test could possibly be "biased" or unfair (Hebel, 1999; St. John, Simmons & Musoba, 1999;

Marklein, 2000). This stagnant trend that continues to occur leaves most to wonder how valid a college entrance exam is in determining the acceptance of a student into college.

Since scores from the ACT are still required for admission into universities in Mississippi, coaching may take place to assist some of these students. If an examinee's score improves for the ACT by coaching, cultural bias is suggested. Even though coaching has been rarely available to poor students, the wealthy have been able to take advantage of coaching. While urban and rural schools have been hard pressed for funds, suburban school districts and private schools have been able to provide review courses to help achievement for these entrance exams (Smith, 1995).

Students that learn test-taking strategies can increase their test scores if information is made available. Although according to Sandoval et al. (1998), the effectiveness of special training or coaching on admission test performance has been controversial. Even though coaching can result in limited gain, students can create expectations with training programs. Long term courses that foster the learning of academic knowledge is more likely to result in effective and stable improvement than short courses that provide tricks to promote score gain. In 1996, the Educational Testing Service (ETS) denied that coaching would make a significant difference in test scores. ETS now admits forty hours of coaching can raise scores by approximately thirty-five points (Beaver, 1996).

The former Mississippi Superintendent of Education Dr. Henry Johnson (2005) asked the question, "Is Mississippi Adequate Education Program (MAEP) to be followed?" The formula for MAEP is simple in and of itself. The Mississippi Board of

Education is required by law to submit a yearly request based upon a funding formula passed by the legislature in 1997. Dr. Johnson reports that the MAEP and Mississippi's Accountability System have made major strides closing the achievement gaps between economically disadvantaged and economically advantaged students. He states that not only will full funding help public schools in Mississippi but also will be an investment that will yield unlimited return.

Although the number of students taking the ACT has increased, the debate over the role the test plays in college admissions is still being debated. An article in *Education Week* depicts the concerns of the National Association for the Advancement of Colored People (NAACP) and the use of the ACT in colleges. The NAACP wants the colleges to "de-emphasize" the importance of the ACT in entering college and creating funded programs for minority students that will help prepare them for the test. Jeffrey Johnson, the National Youth Council's coordinator for the NAACP, believes that the ACT is biased against minority students and is full of barriers that hinder the students from showing their true potential in college. The screening of test questions for bias towards minority students is also a topic that the organization feels should be addressed. With the improvement of test preparation and screening, the NAACP believes the disparity of test scores will no longer exist (Blair, 1999).

According to a 2003 Report from Trends in International Mathematics and Science, students in the U.S. in grades 4 and 8 outperformed many of their international peers. The United States ranked 12th out of 25 nations in 4th grade mathematics and ranked 15th out of 45 nations in 8th grade mathematics. The performance of American

fourth graders in both areas was lower in 2003 than in 1995 relative to the 14 nations that participated in the study (Ashby, 2005a). In the 2003 Program for International Student Assessment (PISA), similar results were found when the United States was outscored by 39 other nations. While white students performed above the PISA average, blacks and Hispanic students performed below the average.

Although ACT test scores of minority groups have increased by 0.10 of a point since 2003, the African-Americans have the lowest average score of 17.1. This is evident when compared to the average composite scores of White students, 21.8; American Indians and Alaskan Natives, 18.8; and Mexican-Americans and Chicanos, 18.4 (Raftery, 2004).

The Effects of Gender Issues on Standardized Tests

Wood (1993) stated that when speaking of achievement in tests, gender bias has been discussed as a possible topic. College admission test, which are widely used all over America, constantly under-predict the abilities of the girls taking the test that make up fifty-two percent of the test takers. In high school and college, girls earn higher grades than the boys, yet the girls make lower on the American College Test and other test such as the Scholastic Aptitude Test and Preliminary Scholastic Assessment exams (Rosser, 1987). The Federal Office of Civil Rights in the U. S. Department of Education has mediated a case in which the Educational Testing Service has been under attack. It was noticed the chances for women to receive National Merit Scholarships were diminished when there is such a dependence on biased exams (Rosser, 1987).

Mau and Lynn (2001) stated that males in late adolescence and early adulthood make higher than females on cognitive and reasoning ability aptitude tests for college entrance, but during the actual years at college females make higher grades than males. The reasoning for this has yet to be found. The number of assessments based on cognitive and coursework abilities will determine the difference in the educational gap between males and females in their late adolescence and early adulthood. The males perform better on cognitive tests while the females perform better on the coursework. Five other studies (Farmer, 1983; Neville & Super, 1988; Linn, 1990; Watson & Stead, 1990; Luzzo, 1994) found that females have a higher work ethic than males. This may be the reasoning behind the higher grades on class work. Also, females tend to be better on essay writing and spelling as found by a meta-analysis by Hyde and Linn (1988).

Gifford (1992) stated that the difficulty on individual items for different groups has to be identified to test for these biases. The process is called differential items functioning (DIF). A differential items functioning helps find the problem items that will not affect the overall ability level. This process does not test whether the test as a whole is bias, yet it tests whether each item on the test is bias toward group differences.

Willingham and Cole (1997noted the scoring process is blind to gender on tests, but gender bias may play a role in the multiple-choice questions or administrative practices. Gender may also be recognized on tests that require essay questions or some other type of performance evaluation. Gender-related bias could then influence the subjective evaluation.

Due to mounting concern over the ACT in college admissions, racial, cultural, and gender bias are addressed in the new enhanced version of the ACT, as well as, the needs of college admission personnel (Bontekoe, 1992) and was administered in February of 2005. The new test emphasizes writing and reading skills. The writing section will also be available for admission counselors to view when scoring. The writing section will also be compared with the admission essay in the application during admissions that will affect how students complete their packets over time. Parents and students are concerned about how the preparation and need of the test have changed in the college the student is attempting to enroll in. College and university personnel must become acquainted with the new tests in order to help students and notice changes needed in admission requirements that do not adequately reflect current research (Greene & Greene, 2004).

To rid the chance of any future bias, the Education Department's Office for Civil Rights (OCR) published policy guidelines that caused panic for colleges and testing officials. The guidelines set forth were to make sure that the colleges and universities knew that if they used test scores alone to determine admission that proof had to be shown that no civil right or anti-discriminatory statue was violated. Any test that affects any particular race, national origin, or gender was discriminatory (Collison, 1999).

Summary

Since the ACT is one of the main tests that colleges and universities use in the college admissions process, there will be continuous debate on its effectiveness at measuring academic success for high school students as well as college students (Greene & Greene, 2004).

This review of the literature section provided ideas about the ACT and it uses. The purpose of this study is to investigate if there is a relationship between achievements as measured by the ACT assessment scores to a number of selected variables. According to Ang and Noble (1993), the ACT was intended to measure the skills and knowledge the student learned in high school college preparatory classes and it was also intended to measure a student's academic abilities and skills across a broad spectrum of college freshman classes.

CHAPTER III

METHODOLOGY

This chapter presents the research and statistical procedures used in the study. The chapter is divided into the following sections: (a) Research Design, (b) Population and Sample, (c) Data Collection, (d) Instrumentation, and (e) Analysis. The problem statement: is there a difference between Mississippi high school students' ACT scores as measured by the ACT assessment sub-scale scores using variables in the Student Profile Section as the independent variables: (a) race or ethnicity, (b) gender, (c) class size, and (d) high school curriculum, and the research questions serves as the conceptual framework for this study.

Research Design

The research design that is most appropriate for this study is causal comparative or *ex post facto*. According to Borg and Gall (1989), the causal comparative model is designed for the discovery of possible causes and effect of a behavior pattern or personal characteristic; this procedure compares certain subjects where behaviors exist to similar subjects in whom these behaviors are absent or present but to a less significant degree. Rumrill and Schenker (2004) stated that the causal comparative model is generally designed to involve the use of pre-existing groups to explore differences in

outcomes. Airasian and Gay (2003) mention that the basic assumption of causal comparative research starts with an effect and seeks a possible cause.

Population and Sample

The population of this study consisted of 16,779 Mississippi high school students who took the 2005 ACT. The target is the population of Mississippi graduating seniors (N = 16,779) that took the ACT assessment in 2005. Of all the 2005 graduates in Mississippi, only ninety-four percent were tested and the average composite score was 18.7 (ACT, Inc., 2005)

Stratified random samples were taken from the target population of 16,779 high school seniors in public schools in Mississippi that took the test in 2005. Stratified random samples represent the participants in this study. Group numbers of not less than thirty students and not more than five hundred students are provided in each level of the independent variables by using the SPSS stratified random sampling procedure (Roscoe, 1975). Stratification is based upon the following independent variables: race or ethnicity, gender, class size, and high school curriculum. These random samples help ensure that representative numbers of subjects are used in the analysis to best represent the populations described in this study.

Choosing the appropriate sample size is important to the ability to (a) obtain the best representative sample of students and (b) to satisfy the assumptions of the Analysis of Variance statistical analytical procedures. If the sample is too small, the results cannot correctly represent the population even if the sample is chosen carefully. Although it is

difficult to know what is too small or too large, it relies mainly on the type of research being conducted in the study (Gay & Airasian, 2003).

Data Collection

The researcher requested approval from the Mississippi State University Institutional Review Board (IRB) to conduct this study. Telephone or email contact were made with the American College Testing Program and the Mississippi Department of Education, with an official letter sent from the researcher requesting permission to use the ACT information in this study. The American College Testing program in Iowa City, IA and the Mississippi Department of Education were asked to provide the test data.

This study used the 2005 ACT Registration folder, which includes the Student Profile Section. The Student Profile section asks the examinee for information about items such as background, interests, needs, and plans. This portion of the booklet includes one hundred ninety questions that the examinee answers on page three of the registration folder. All tested students complete the ACT Student Profile Section. The variables studied come from the enhanced ACT scores and student profile section responses that were completed when the examinee registered for the ACT (The American College Testing Program, 2005). The variables selected for statistical analysis are students in varying class sizes, students that were enrolled in college preparatory courses versus non-college preparatory courses, and students of different gender and race or ethnicity.

Instrumentation

The ACT assessment program is a comprehensive evaluation, guidance, and placement service that students and educators use during the transition from high school to college. The ACT testing program was selected because it is widely used in the state of Mississippi for college entrance career choices and course placement. The ACT has four subtest in the areas of mathematics, social studies, science reasoning, and English. An examinee's composite score is the arithmetic mean of the four subtest score (Shannon, 1992).

The American College Test (ACT) is a nationally normed test that was developed in Iowa City, IA. The test was created to assess the aptitudes and abilities of high school students. This test is especially important to students who desire to attend a post-secondary institution of higher learning (Pappas, 1990). The latest ACT Assessment Technical Manual (1997) states the reliability coefficients of the 1995-1996 ACT test were as follows: *English (r* =.91), *mathematics* (r = .91) *reading (r* = .86*), and science reasoning (r* = .84*).*

The developers of the ACT continue to address three major factors that bear on test content validity: (1) the fairness of the test passages and questions, (2) the extent to which the diverse cultures of the United States are represented on the test, and (3) the influence of the tests on instruction (ACT, 2003). In the development of an educational test, discriminating against any group on any basis other than knowledge and skill in the content domain being measured must be avoided. Since issues of fairness, showing no insignificant differences, could arise, ACT has used statistical checks and independent

reviews in an effort to stamp out unfair passages or questions. These procedures have long been a part of the test development and evaluation procedures. To guard against perceived notions of unfairness in the test, ACT continually refines its procedures to support the content validity of the test (ACT, 2003).

As part of the ACT brochure, ACT includes the Student Profile inventory. The inventory asks for information about students' interests, needs, and plans. The questions used for this study from the ACT Student Profile inventory section are:

Student Profile Question #83

The program of high school courses I took can best be described as:
Business or Commercial 1
Vocational-Occupational 2
College Preparatory 3
Other or General 4

Student Profile Question #65

Which of the phrases below best describes your racial/ethnic group as generally recognized by your family and friends?
Afro-American/Black 1
American Indian, Alaskan Native.....2
Caucasian-American, White 3
Mexican-American, Chicano 4
Asian-American, Pacific Islander 5
Puerto Rican, Cuban, Other Hispanic Origin.....6
Other 7

Student Profile Question #79

The number of students in my high school graduating class is (was):
Fewer than 25.....1
25-99 2
100-199 3
200-399 4
400-599 5
600-899 6
900 or more 7

Section E on ACT Registration Folder

Indicate gender:
Male
Female

Analysis

The statistical analysis was performed at Mississippi State University. The statistical tests were assessed at .05 alpha level. This study examined the difference between selected variables from the ACT Student Profile Section and the ACT composite score. To examine the differences, Factorial Analysis of Variance (ANOVA) was used because the study focuses on more than one variable or factor, and the data scale is at the least interval (Sprinthall, 2003).

Research question one: Is there a statistically significant difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students), who graduated from schools with very large graduating class sizes (900 or more students), large graduating class sizes (600-899), medium graduating class sizes (400 to 599 students), and small graduating class sizes (399 or fewer students) in Mississippi? The dependent variables are the ACT mathematics, English, reading, and science reasoning sub-scales.

Procedure: Factorial Analysis of Variance (ANOVA) is the most appropriate statistical analytical procedure to use for research question one because it was used to determine if any statistically significant differences exist in the 2005 ACT sub-scale scores of students from the various graduating class sizes in Mississippi being controlled for ethnicity.

Research question two: Is there a statistically significant difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students) and class size (very large, large, medium, and small), who completed high school curriculum program courses in (1)business or commercial, (2)vocational-occupational, (3)college preparatory, and (4)other general programs in Mississippi? The dependent variables are the ACT mathematics, English, reading, and science reasoning sub-scales.

Procedure: Factorial Analysis of Variance (ANOVA) is the most appropriate statistical analytical procedure to use for research question two because it was used to determine if any statistically significant differences exist in the 2005 ACT sub-scale scores of students who took high school college preparatory curriculum and those students who took the non-college preparatory curriculum in Mississippi being controlled for ethnicity.

Research question three: Is there a statistically significant difference in mean 2005 ACT sub-scale scores between males and females, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students) and class size (very large, large, medium, and small), in Mississippi? The dependent variables are the ACT mathematics, English, reading, and science reasoning sub-scales.

Procedure: Factorial Analysis of Variance (ANOVA) is the most appropriate statistical analytical procedure to use for research question three because it was used to determine if any statistically significant difference between males and females in Mississippi exist being controlled for ethnicity.

Research question four: Which demographic variables in the 2005ACT Student Profile Section, (a) gender, (b) race and ethnicity, (c) class size, and (d) high school curriculum are the best predictors of mean 2005 ACT sub-scale scores of the high school graduates?

Procedure: Multiple linear regression analyses were performed to determine which variables in the Student Profile Section of the ACT are the best predictors of success on the sub-scale scores of the ACT. The multiple regression analysis accounts for the statistically significant amount of variation in dependent variables. All regression analyses were preformed using the enter method of selecting the predictor variables. The regression analysis estimates the coefficients of a linear equation involving the independent variables that best predict the value of the dependent variable. Multiple regression determines the relative importance of each independent variable related to the mean ACT sub-score outcome measure used in the analysis. Variables that were used as predictor variables for regression analysis were demographic variables listed in the ACT. The criterion variables used in the analysis are sub-scale scores of the ACT. They are (a) mathematics, (b) English, (c) reading, and (d) science reasoning. One way to determine or assess the relative importance of independent variables in the regression equation is to consider the variance in the dependent variable (R^2 value) when a variable is entered into the regression equation that already contains the other independent variables (Pedhauzer, 1997). All multiple regression analyses were performed at the .05 level of statistical significance.

Assumptions of ANOVA

According to Hill and Lewicki (2006), there are four assumptions of the ANOVA. The first is the deviation from normal distribution where the dependent variable is measured on an interval scale and normally distributed within the groups. For conclusion validity, equal group sizes are needed for Analysis of Variance. Therefore, group sizes of thirty are used in this study. The second is the homogeneity of variances where it is assumed that the different group variances are identical. The third assumption is the homogeneity of variances and covariances that is when the variances and covariances have to be identical when multiple dependent variables are being used in the study. Finally, the fourth assumption is sphericity and compound symmetry. Identical variances and covariances of the different repeated measures are required for compound symmetry but is not necessary. The sphericity assumption states the *within-subject 'model'* is made of independent components, which is necessary.

Assumptions of Multiple Linear Regression

McClave (2001) stated there are two assumptions in using the multiple regression analysis. The assumptions are (a) for any given set of values of x, the random error $\in$ has a normal probability distribution with mean equal to 0 and variance equal to σ^2 and (b) the random errors are independent (in a probabilistic sense). The variance of the random error $\in$ is σ^2.

Summary

In conclusion, Chapter III stated the research design used in this study, the population of 2005 high school students in Mississippi and how the samples of these students were abstracted; the description of the ACT as the instrument for the study; and how the ACT composite score data was analyzed with the differing variables from the ACT Student Profile Section.

CHAPTER IV

FINDINGS

The results of this study are presented in the order of the research questions to be answered by the study. The research interests include: (a) the difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students), who graduated from schools with very large graduating class sizes (900 or more students), large graduating class sizes (600-899), medium graduating class sizes (400 to 599 students), and small graduating class sizes (399 or fewer students) in Mississippi with the dependent variables being the ACT mathematics, English, reading, and science reasoning sub-scale scores, (b) the difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students) and class size (very large, large, medium, and small), who completed high school curriculum program courses in business or commercial, vocational-occupational, college preparatory, and other general programs in Mississippi with the dependent variables; ACT mathematics, English, reading, and science reasoning sub-scale scores, (c) the difference in mean 2005 ACT sub-scale scores between males and females, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students) and class size (very large, large, medium, and small), in Mississippi with the dependent variables; ACT

mathematics, English, reading, and science reasoning sub-scale scores, and (d) the demographic variables in the 2005 ACT Student Profile Section; gender, race/ethnicity, class size, and high school curriculum that are the best predictors of mean 2005 ACT sub-scale scores of the high school graduates in Mississippi. The means of the ACT sub-scores were calculated and tested for statistically significant differences using analysis of variance (ANOVA). Means, standard deviations, and observations were reported. Simple effects test were run on all statistically significant interactions. Multiple linear regressions were performed on question 4 to test which demographic variable was the best predictor of ACT sub-scores.

The results of Mississippi's 2005 ACT Assessment were obtained from ACT, Inc. All significance tests were performed at the .05 alpha level. All statistical analyses were performed on SPSS 14.0 (2005) on the campus of Mississippi State University.

Research Question 1

Research question 1 asks is there a statistically significant difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (African American/Black, Caucasian-American/White, and other students), who graduated from schools with graduating class of 900 or more, 600-899, 400-599, and 399 or below in Mississippi? The dependent variables are the ACT mathematics, English, reading and science reasoning sub-scale scores. The SPSS statistical program was first used to examine the descriptive statistics of the variables.

A stratified random sample (n = 16,779) was taken from the population of students taking the 2005 ACT in Mississippi. This stratified random sample represents

the population of students that responded to Question Number 79 and Question Number 65 on the students profile section of the questionnaire:

Student Profile Question #79

The number of students in my high school graduating class is (was):
Fewer than 25.....1
25-99 2
100-199 3
200-399 4
400-599 5
600-899 6
900 or more 7

Student Profile Question #65

Which of the phrases below best describes your racial/ethnic group as generally recognized by your family and friends?
Afro-American/Black 1
American Indian, Alaskan Native.....2
Caucasian-American, White 3
Mexican-American, Chicano 4
Asian-American, Pacific Islander 5
Puerto Rican, Cuban, Other Hispanic Origin.....6
Other 7

Four ACT subtest areas are represented: (a) English, (b) mathematics, (c) reading, and (d) science reasoning. The data were analyzed for descriptives and then with the Analysis of Variance (ANOVA) for the statistically significant differences.

Table 1

Descriptive Statistics of English ACT Score by Race and Class Size

English	*n*	*SD*	*M*
African American vs class size 399 and below	2322	3.54	13.76
African American vs class size 400-599	1625	3.76	15.23
African American vs class size 600 –899	1878	4.04	17.32
African American vs class size 900 or more	889	4.76	20.98
White vs class size 399 and below	254	4.18	15.47
White vs class size 400-599	201	4.67	16.76
White vs class size 600 - 899	353	4.90	19.37
White vs class size 900 or more	332	5.58	23.90
Other vs class size 399 and below	1666	4.18	16.30
Other vs class size 400-599	1514	4.40	18.19
Other vs class size 600 - 899	2876	4.49	20.38
Other vs class size 900 or more	2869	5.13	25.03

In Table 1, the descriptive statistics for the English ACT score by race and class size resulted in the mean of each race increasing as the class size increased.

Table 2

Descriptive Statistics of Math ACT Score by Race and Class Size

Math	*n*	*SD*	*M*
African American vs class size 399 and below	2322	1.80	14.75
African American vs class size 400-599	1625	2.02	15.34
African American vs class size 600 -899	1878	2.63	16.33
African American vs class size 900 or more	889	3.32	18.51
White vs class size 399 and below	254	2.32	15.78
White vs class size 400-599	201	2.76	16.37
White vs class size 600 -899	353	3.63	18.15
White vs class size 900 or more	332	4.49	21.93
Other vs class size 399 and below	1666	2.45	16.14
Other vs class size 400-599	1514	2.76	17.04
Other vs class size 600 -899	2876	3.43	18.64
Other vs class size 900 or more	2869	4.44	22.12

In Table 2, the descriptive statistics for the Math ACT score by race and class size resulted in the mean of each race increasing as the class size increased.

Table 3

Descriptive Statistics of Reading ACT Score by Race and Class Size

Reading	*n*	*SD*	*M*
African American vs class size 399 and below	2322	2.98	14.45
African American vs class size 400-599	1625	3.50	15.61
African American vs class size 600 -899	1878	4.08	17.05
African American vs class size 900 or more	889	4.83	20.15
White vs class size 399 and below	254	4.01	16.42
White vs class size 400-599	201	4.40	17.39
White vs class size 600 -899	353	5.16	19.38
White vs class size 900 or more	332	5.87	23.87
Other vs class size 399 and below	1666	4.25	17.05
Other vs class size 400-599	1514	4.57	18.48
Other vs class size 600 -899	2876	4.87	20.33
Other vs class size 900 or more	2869	5.53	24.29

In Table 3, the descriptive statistics for the Reading ACT score by race and class size resulted in the mean of each race increasing as the class size increased.

Table 4

Descriptive Statistics of Science ACT Score by Race and Class Size

Science	*n*	*SD*	*M*
African American vs class size 399 and below	2322	2.92	15.44
African American vs class size 400-599	1625	3.04	16.29
African American vs class size 600 -899	1878	3.22	17.38
African American vs class size 900 or more	889	3.31	19.39
White vs class size 399 and below	254	3.36	16.77
White vs class size 400-599	201	3.51	17.17
White vs class size 600 -899	353	3.83	19.56
White vs class size 900 or more	332	4.31	22.28
Other vs class size 399 and below	1666	3.37	17.31
Other vs class size 400-599	1514	3.44	18.46
Other vs class size 600 -899	2876	3.55	19.76
Other vs class size 900 or more	2869	4.08	22.67

In Table 4, the descriptive statistics for the Science reasoning ACT score by race and class size resulted in the mean of each race increasing as the class size increased. Table 5 shows the relationships of the variables (race and class size) in each area of English, mathematics, reading, and science reasoning using the ANOVA statistical test.

Table 5

Testing Differences in English, Math, Reading, and Science ACT Score by the Independent Variables, Race and Class Size: Results of ANOVA

Index	F-ratio	*P*
English		
Race	890.00	.000*
Class Size	1226.40	.000*
Race* Class Size	8.45	.000*
Math		
Race	908.70	.000*
Class Size	1073.48	.000*
Race* Class Size	40.99	.000*
Reading		
Race	891.46	.000*
Class Size	823.63	.000*
Race* Class Size	9.92	.000*
Science		
Race	847.02	.000*
Class Size	742.14	.000*
Race* Class Size	14.98	.000*

Note. * p < .05

There was a statistically significant difference at the .05 level among race in the English ACT sub-score, F (2, 6) = 890.00, $p < .001$. There was a statistically significant difference at the .05 level among the class sizes in the English ACT sub-score, F (3,6) = 1226.40, $p < .001$. There was a statistically significant interaction between race and class size in the English ACT sub-score, F (2,3) = 8.45, $p < .001$. Since there was a statistically significant interaction, a simple effects test was conducted.

Table 6

Simple Effects of English ACT Score by Race and Class Size

Race	Class Size	Mean difference	*p*
African American	399 and below vs 400-599	1.47	.000*
	399 and below vs 600 -899	3.56	.000*
	399 and below vs 900 or more	7.22	.000*
	400-599 vs 600 -899	2.09	.000*
	400-599 vs 900 or more	5.75	.000*
	600-899 vs 900 or more	3.66	.000*
White	399 and below vs 400-599	1.31	.001*
	399 and below vs 600 -899	3.90	.000*
	399 and below vs 900 or more	8.43	.000*
	400-599 vs 600 -899	2.61	.000*
	400-599 vs 900 or more	7.24	.000*
	600-899 vs 900 or more	4.53	.000*
Other	399 and below vs 400-599	1.89	.000*
	399 and below vs 600 -899	4.08	.000*
	399 and below vs 900 or more	8.73	.000*
	400-599 vs 600 -899	2.19	.000*
	400-599 vs 900 or more	6.84	.000*
	600-899 vs 900 or more	4.65	.000*

Note. * $p < .05$

The simple effects test in Table 6 of English ACT sub-scores by race and class size at a .05 level resulted in African Americans with a class size of 400-599 (M = 15.23, SD = 3.76, n = 1625) having a statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (M = 13.76, SD = 3.54, n = 2322); African American with a class size of 600-899 (M = 17.32, SD = 4.04, n = 1878) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (M = 13.76, SD = 3.54, n = 2322) and the class size of 400-599 (M = 15.23, SD = 3.76, n = 1625); African Americans with

a class size of 900 or more (*M* = 20.98, *SD* = 4.76, *n* =889) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* = 13.76, *SD* = 3.54, *n* = 2322), 400-599 (*M* = 15.23, *SD* = 3.76, *n* = 1625), and 600-899 (*M* = 17.32, *SD* = 4.04, *n* = 1878); White with a class size of 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.47, *SD* = 4.18, *n* = 254);White with a class size of 600-899 (*M* = 19.37, *SD* = 4.90, *n* = 353) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.47, *SD* = 4.18, *n* = 254) and the class size of 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201);White with a class size of 900 or more (*M* = 23.90, *SD* = 5.58, *n* = 332) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.47, *SD* = 4.18, *n* = 254), 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201), and 600-899 (*M* = 19.37, *SD* = 4.90, *n* = 353); Other with a class size of 400-599 (*M* = 18.19, *SD* = 4.40, *n* = 1514) having a statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.30, *SD* = 4.18, *n* = 1666);Other with a class size of 600-899 (*M* = 20.38, *SD* = 4.49, *n* = 2876) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.30, *SD* = 4.18, *n* = 1666) and the class size of 400-599 (*M* = 18.19, *SD* = 4.40, *n* = 1514);Other with a class size of 900 or more (*M* = 25.03, *SD* = 5.13, *n* = 2869) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* =

16.30, *SD* = 4.18, *n* = 1666), 400-599 (*M* = 18.19, *SD* = 4.40, *n* = 1514), and 600-899 (*M* = 20.38, *SD* = 4.49, *n* = 2876).

There was a statistically significant difference at the .05 level among race in the Math sub-score, F (2,6) = 908.70, $p < .001$. There was a statistically significant difference at the .05 level among the class sizes in the Math ACT sub-score, F (3,6) = 1073.48, $p < .001$. There was a statistically significant interaction between race and class size in the Math ACT sub-score, F (2,3) = 40.99, $p < .001$. Since there is a statistically significant interaction, a simple effects test was conducted.

Table 7

Simple Effects of Math ACT Score by Race and Class Size

Race	Class Size	Mean difference	*p*
African American	399 and below vs 400-599	.59	.000*
	399 and below vs 600 -899	1.58	.000*
	399 and below vs 900 or more	3.76	.000*
	400-599 vs 600 -899	.99	.000*
	400-599 vs 900 or more	3.17	.000*
	600-899 vs 900 or more	2.18	.000*
White	399 and below vs 400-599	.58	.046*
	399 and below vs 600 -899	2.37	.000*
	399 and below vs 900 or more	6.15	.000*
	400-599 vs 600 -899	1.79	.000*
	400-599 vs 900 or more	5.57	.000*
	600-899 vs 900 or more	2.78	.000*
Other	399 and below vs 400-599	.90	.000*
	399 and below vs 600 -899	2.50	.000*
	399 and below vs 900 or more	5.98	.000*
	400-599 vs 600 -899	1.60	.000*
	400-599 vs 900 or more	5.08	.000*
	600-899 vs 900 or more	3.48	.000*

Note. * p < .05

The simple effects test in Table 7 of Math ACT sub-scores by race and class size at a .05 level resulted in African Americans with a class size of 400-599 (*M* = 15.23, *SD* = 3.76, *n* = 1625) having a statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 13.76, *SD* = 3.54, *n* = 2322); African American with a class size of 600-899 (*M* = 17.32, *SD* = 4.04, *n* = 1878) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 13.76, *SD* = 3.54, *n* = 2322) and the class size of 400-599 (*M* = 15.23, *SD* = 3.76, *n* = 1625); African Americans with a class size of 900 or more (*M* = 20.98, *SD* = 4.76, *n* = 889) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 13.76, *SD* = 3.54, *n* = 2322), 400-599 (*M* = 15.23, *SD* = 3.76, *n* = 1625), and 600-899 (*M* = 17.32, *SD* = 4.04, *n* = 1878); White with a class size of 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201) scored statistically significantly lower Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.47, *SD* = 4.18, *n* = 254);White with a class size of 600-899 (*M* = 19.37, *SD* = 4.90, *n* = 353) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.47, *SD* = 4.18, *n* = 254) and the class size of 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201);White with a class size of 900 or more (*M* = 23.90, *SD* = 5.58, *n* = 332) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.47, *SD* = 4.18, *n* = 254), 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201), and 600-899 (*M* = 19.37, *SD* = 4.90, *n* = 353); Other with a class size of 400-599 (*M* = 18.19, *SD* = 4.40, *n* = 1514) having a

statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (M = 16.30, SD = 4.18, n = 1666);Other with a class size of 600-899 (M = 20.38, SD = 4.49, n = 2876) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (M = 16.30, SD = 4.18, n = 1666) and the class size of 400-599 (M = 18.19, SD = 4.40, n = 1514);Other with a class size of 900 or more (M = 25.03, SD = 5.13, n = 2869) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (M = 16.30, SD = 4.18, n = 1666), 400-599 (M = 18.19, SD = 4.40, n = 1514), and 600-899 (M = 20.38, SD = 4.49, n = 2876).

There was a statistically significant difference at the .05 level among race in the Reading ACT sub-score, F (2,6) = 891.46, $p < .001$. There was a statistically significant difference at the .05 level among the class sizes in the Reading ACT sub-score, F (3,6) = 823.63, $p < .001$. There was a statistically significant interaction between race and class size in the Reading ACT sub-score, F (2,3) = 9.92, $p < .001$. Since there is a statistically significant interaction, a simple effects test was conducted.

Table 8

Simple Effects of Reading ACT Score by Race and Class Size

Race	Class Size	Mean difference	*p*
African American	399 and below vs 400-599	1.16	.000*
	399 and below vs 600 -899	2.60	.000*
	399 and below vs 900 or more	5.70	.000*
	400-599 vs 600 -899	1.44	.000*
	400-599 vs 900 or more	4.54	.000*
	600-899 vs 900 or more	3.10	.000*
White	399 and below vs 400-599	.97	.023*
	399 and below vs 600 -899	2.96	.000*
	399 and below vs 900 or more	7.45	.000*
	400-599 vs 600 -899	1.99	.000*
	400-599 vs 900 or more	6.48	.000*
	600-899 vs 900 or more	4.49	.000*
Other	399 and below vs 400-599	1.43	.000*
	399 and below vs 600 -899	3.28	.000*
	399 and below vs 900 or more	7.24	.000*
	400-599 vs 600 -899	1.85	.000*
	400-599 vs 900 or more	5.81	.000*
	600-899 vs 900 or more	3.96	.000*

Note. * $p < .05$

The simple effects test in Table 8 of Reading ACT sub-scores by race and class size at a .05 level resulted in African Americans with a class size of 400-599 (M = 15.23, SD = 3.76, n = 1625) having a statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (M = 13.76, SD = 3.54, n = 2322); African American with a class size of 600-899 (M = 17.32, SD = 4.04, n = 1878) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (M = 13.76, SD = 3.54, n = 2322) and the class size of 400-599 (M = 15.23, SD = 3.76, n = 1625); African Americans with

a class size of 900 or more (*M* = 20.98, *SD* = 4.76, *n* = 889) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 13.76, *SD* = 3.54, *n* = 2322), 400-599 (*M* = 15.23, *SD* = 3.76, *n* = 1625), and 600-899 (*M* = 17.32, *SD* = 4.04, *n* = 1878); White with a class size of 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.47, *SD* = 4.18, *n* = 254);White with a class size of 600-899 (*M* = 19.37, *SD* = 4.90, *n* = 353) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.47, *SD* = 4.18, *n* = 254) and the class size of 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201);White with a class size of 900 or more (*M* = 23.90, *SD* = 5.58, *n* = 332) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.47, *SD* = 4.18, *n* = 254), 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201), and 600-899 (*M* = 19.37, *SD* = 4.90, *n* = 353); Other with a class size of 400-599 (*M* = 18.19, *SD* = 4.40, *n* = 1514) having a statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.30, *SD* = 4.18, *n* = 1666);Other with a class size of 600-899 (*M* = 20.38, *SD* = 4.49, *n* = 2876) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.30, *SD* = 4.18, *n* = 1666) and the class size of 400-599 (*M* = 18.19, *SD* = 4.40, *n* = 1514);Other with a class size of 900 or more (*M* = 25.03, *SD* = 5.13, *n* = 2869) scored statistically significantly higher Reading ACT mean score than did those who graduated from the

class size of 399 or below (M = 16.30, SD = 4.18, n = 1666), 400-599 (M = 18.19, SD = 4.40, n = 1514), and 600-899 (M = 20.38, SD = 4.49, n = 2876).

There was a statistically significant difference at the .05 level among race in the Science reasoning ACT sub-score, F (2,6) = 847.02, p < .001. There was a statistically significant difference at the .05 level among the class sizes in the Science reasoning ACT sub-score, F (3,6) = 742.14, p < .001. There was a statistically significant interaction between race and class size in the Science reasoning ACT sub-score, F (2,3) = 14.98, p < .001. Since there is a statistically significant interaction, a simple effects test was conducted.

Table 9

Simple Effects of Science ACT Score by Race and Class Size

Race	Class Size	Mean difference	*p*
African American	399 and below vs 400-599	.85	.000*
	399 and below vs 600 -899	1.94	.000*
	399 and below vs 900 or more	3.94	.000*
	400-599 vs 600 -899	1.09	.000*
	400-599 vs 900 or more	3.10	.000*
	600-899 vs 900 or more	2.01	.000*
White	399 and below vs 400-599	.40	.224
	399 and below vs 600 -899	2.79	.000*
	399 and below vs 900 or more	5.51	.000*
	400-599 vs 600 -899	2.39	.000*
	400-599 vs 900 or more	5.11	.000*
	600-899 vs 900 or more	2.72	.000*
Other	399 and below vs 400-599	1.15	.000*
	399 and below vs 600 -899	2.45	.000*
	399 and below vs 900 or more	5.36	.000*
	400-599 vs 600 -899	1.30	.000*
	400-599 vs 900 or more	4.21	.000*
	600-899 vs 900 or more	2.91	.000*

Note. * p < .05

The simple effects test in Table 9 of Science reasoning ACT sub-scores by race and class size at a .05 level resulted in African Americans with a class size of 400-599 (*M* =15.23, *SD* = 3.76, *n* = 1625) having a statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 13.76, *SD* = 3.54, *n* = 2322); African American with a class size of 600-899 (*M* = 17.32, *SD* = 4.04, *n* = 1878) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 13.76, *SD* = 3.54, *n* = 2322) and the class size of 400-599 (*M* = 15.23, *SD* = 3.76, *n* = 1625); African Americans with a class size of 900 or more (*M* = 20.98, *SD* = 4.76, *n* = 889) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 13.76, *SD* = 3.54, *n* = 2322), 400-599 (*M* = 15.23, *SD* = 3.76, *n* = 1625), and 600-899 (*M* = 17.32, *SD* = 4.04, *n* = 1878); White with a class size of 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201) scored statistically significantly lower Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.47, *SD* = 4.18, *n* = 254);White with a class size of 600-899 (*M* = 19.37, *SD* = 4.90, *n* = 353) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.47, *SD* = 4.18, *n* = 254) and the class size of 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201);White with a class size of 900 or more (*M* = 23.90, *SD* = 5.58, *n* = 332) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.47, *SD* = 4.18, *n* = 254), 400-599 (*M* = 16.76, *SD* = 4.67, *n* = 201), and 600-899 (*M* =

19.37, *SD* = 4.90, *n* = 353); Other with a class size of 400-599 (*M* = 18.19, *SD* = 4.40, *n* = 1514) having a statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.30, *SD* = 4.18, *n* = 1666);Other with a class size of 600-899 (*M* = 20.38, *SD* = 4.49, *n* = 2876) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.30, *SD* = 4.18, *n* = 1666) and the class size of 400-599 (*M* = 18.19, *SD* = 4.40, *n* = 1514);Other with a class size of 900 or more (*M* = 25.03, *SD* = 5.13, *n* = 2869) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.30, *SD* = 4.18, *n* = 1666), 400-599 (*M* = 18.19, *SD* = 4.40, *n* = 1514), and 600-899 (*M* = 20.38, *SD* = 4.49, *n* = 2876).

Research Question 2

Research question 2 asks if there is a statistically significant difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (African American/Black, Caucasion-American/White, and other students) and class size (900 or more, 600-899, 400-599, and 399 or below), who completed high school curriculum program courses in business or commercial, vocational-occupational, college preparatory, and other general programs in Mississippi? The dependent variables are the ACT mathematics, English, reading and science reasoning sub-scale scores.

A stratified random sample (*n* = 16779) was taken from the population of students taking the 2005 ACT in Mississippi. This stratified random sample represents the

population of students that responded to Question Number 83 on the students profile section of the questionnaire:

Student Profile Question #83

The program of high school courses I took can best be described as:
Business or Commercial 1
Vocational-Occupational 2
College Preparatory 3
Other or General 4

Four ACT subtest areas are represented: (a) English, (b) mathematics, (c) reading, and (d) science reasoning. The data were analyzed for descriptives and then with the Analysis of Variance (ANOVA) for statistically significant differences.

Table 10

Descriptive Statistics of English ACT Score by Race and Class Size based on Business and Vocational Programs

English	*n*	*SD*	*M*
African American vs class size 399 and below	645	3.36	13.28
African American vs class size 400-599	344	3.53	14.17
African American vs class size 600 -899	330	3.71	15.95
African American vs class size 900 or more	95	4.47	18.53
White vs class size 399 and below	293	3.82	15.17
White vs class size 400-599	215	4.26	16.53
White vs class size 600 -899	326	4.10	18.43
White vs class size 900 or more	130	4.29	21.55
Other vs class size 399 and below	50	3.69	14.36
Other vs class size 400-599	48	3.75	15.35
Other vs class size 600 -899	49	4.29	17.61
Other vs class size 900 or more	16	5.20	21.44

In Table 10, the descriptive statistics for the English ACT score by race and class size based on business and vocational programs resulted in the mean of each race increasing as the class size increased.

Table 11

Descriptive Statistics of English ACT Score by Race and Class Size for College Preparatory Program

English	*n*	*SD*	*M*
African American vs class size 399 and below	897	3.58	14.13
African American vs class size 400-599	776	3.72	15.75
African American vs class size 600 -899	1060	4.05	17.87
African American vs class size 900 or more	600	4.72	21.53
White vs class size 399 and below	88	4.36	17.20
White vs class size 400-599	89	4.43	18.90
White vs class size 600 -899	195	4.45	21.02
White vs class size 900 or more	249	5.16	25.48
Other vs class size 399 and below	562	4.11	16.08
Other vs class size 400-599	651	5.03	17.58
Other vs class size 600 -899	1630	4.96	19.85
Other vs class size 900 or more	2187	5.67	24.42

In Table 11, the descriptive statistics for the Math ACT score by race and class size based on college and preparatory programs resulted in the mean of each race increasing as the class size increased.

Table 12

Descriptive Statistics of English ACT Score by Race and Class Size for Other or General Program

English	*n*	*SD*	*M*
African American vs class size 399 and below	757	3.60	13.72
African American vs class size 400-599	495	3.82	15.17
African American vs class size 600 -899	470	3.97	17.04
African American vs class size 900 or more	187	4.55	20.37
White vs class size 399 and below	114	4.02	15.50
White vs class size 400-599	62	4.26	16.75
White vs class size 600 -899	105	4.42	19.36
White vs class size 900 or more	65	4.72	22.43
Other vs class size 399 and below	793	4.41	15.50
Other vs class size 400-599	638	4.60	16.76
Other vs class size 600 -899	898	4.96	19.36
Other vs class size 900 or more	535	4.82	22.43

In Table 12, the descriptive statistics for the English ACT score by race and class size based on other or general programs resulted in the mean of each race increasing as the class size increased.

Table 13

Descriptive Statistics of Math ACT Score by Race and Class Size based on Business and Vocational Programs

Math	*n*	*SD*	*M*
African American vs class size 399 and below	645	1.68	14.54
African American vs class size 400-599	344	1.96	15.13
African American vs class size 600 –899	330	2.15	15.74
African American vs class size 900 or more	95	2.98	17.46
White vs class size 399 and below	293	1.87	15.57
White vs class size 400-599	215	2.49	16.57
White vs class size 600 -899	326	3.00	17.85
White vs class size 900 or more	130	3.49	19.52
Other vs class size 399 and below	50	2.14	15.54
Other vs class size 400-599	48	1.78	15.63
Other vs class size 600 -899	49	2.68	17.51
Other vs class size 900 or more	16	3.06	20.50

In Table 13, the descriptive statistics for the Math ACT score by race and class size based on business and vocational programs resulted in the mean of each race increasing as the class size increased.

Table 14

Descriptive Statistics of Math ACT Score by Race and Class Size for College Preparatory Program

Math	*n*	*SD*	*M*
African American vs class size 399 and below	897	1.79	14.88
African American vs class size 400-599	776	2.02	15.53
African American vs class size 600 –899	1060	2.79	16.67
African American vs class size 900 or more	600	3.41	18.82
White vs class size 399 and below	88	2.80	16.68
White vs class size 400-599	89	2.82	17.41
White vs class size 600 -899	195	3.60	19.09
White vs class size 900 or more	249	4.51	22.58
Other vs class size 399 and below	562	2.30	15.97
Other vs class size 400-599	651	3.27	16.98
Other vs class size 600 -899	1630	3.88	18.45
Other vs class size 900 or more	2187	4.66	22.28

In Table 14, the descriptive statistics for the Math ACT score by race and class size based on college preparatory programs resulted in the mean of each race increasing as the class size increased.

Table 15

Descriptive Statistics of Math ACT Score by Race and Class Size for Other or General Program

Math	*n*	*SD*	*M*
African American vs class size 399 and below	757	1.89	14.76
African American vs class size 400-599	495	2.04	15.20
African American vs class size 600 -899	470	2.44	16.02
African American vs class size 900 or more	187	2.97	17.74
White vs class size 399 and below	114	2.26	15.92
White vs class size 400-599	62	2.73	16.81
White vs class size 600 -899	105	3.15	18.11
White vs class size 900 or more	65	3.86	20.89
Other vs class size 399 and below	793	2.42	15.77
Other vs class size 400-599	638	2.40	16.16
Other vs class size 600 -899	898	3.50	17.98
Other vs class size 900 or more	535	3.84	20.94

In Table 15, the descriptive statistics for the Math ACT score by race and class size based on other or general programs resulted in the mean of each race increasing as the class size increased.

Table 16

Descriptive Statistics of Reading ACT Score by Race and Class Size based on Business and Vocational Programs

Reading	*n*	*SD*	*M*
African American vs class size 399 and below	645	3.36	14.04
African American vs class size 400-599	344	3.53	14.85
African American vs class size 600 –899	330	3.71	15.89
African American vs class size 900 or more	95	4.47	18.31
White vs class size 399 and below	293	3.86	14.74
White vs class size 400-599	215	4.23	16.02
White vs class size 600 –899	326	4.30	17.58
White vs class size 900 or more	130	5.27	20.48
Other vs class size 399 and below	50	3.11	15.12
Other vs cla1ss size 400-599	48	3.44	16.04
Other vs class size 600 –899	49	4.55	17.86
Other vs class size 900 or more	16	4.76	22.44

In Table 16, the descriptive statistics for the Reading ACT score by race and class size based on business and vocational programs resulted in the mean of each race increasing as the class size increased.

Table 17

Descriptive Statistics of Reading ACT Score by Race and Class Size for College Preparatory Program

Reading	*n*	*SD*	*M*
African American vs class size 399 and below	897	3.58	14.74
African American vs class size 400-599	776	3.72	16.02
African American vs class size 600 -899	1060	4.05	17.58
African American vs class size 900 or more	600	4.72	20.48
White vs class size 399 and below	88	4.36	17.64
White vs class size 400-599	89	4.43	19.08
White vs class size 600 -899	195	4.45	20.87
White vs class size 900 or more	249	5.16	24.74
Other vs class size 399 and below	562	4.11	16.89
Other vs class size 400-599	651	5.03	18.24
Other vs class size 600 -899	1630	4.96	19.95
Other vs class size 900 or more	2187	5.67	24.26

In Table 17, the descriptive statistics for the Reading ACT score by race and class size based on college preparatory programs resulted in the mean of each race increasing as the class size increased.

Table 18

Descriptive Statistics of Reading ACT Score by Race and Class Size for Other or General Program

Reading	*n*	*SD*	*M*
African American vs class size 399 and below	757	3.02	14.43
African American vs class size 400-599	495	3.44	15.52
African American vs class size 600 -899	470	3.94	16.67
African American vs class size 900 or more	187	4.55	19.90
White vs class size 399 and below	114	4.18	16.95
White vs class size 400-599	62	4.45	18.28
White vs class size 600 -899	105	4.76	19.94
White vs class size 900 or more	65	5.17	23.24
Other vs class size 399 and below	793	4.11	16.62
Other vs class size 400-599	638	4.45	17.34
Other vs class size 600 -899	898	4.98	19.12
Other vs class size 900 or more	535	5.23	22.81

In Table 18, the descriptive statistics for the Reading ACT score by race and class size based on other or general programs resulted in the mean of each race increasing as the class size increased.

Table 19

Descriptive Statistics of Science ACT Score by Race and Class Size based on Business and Vocational Programs

Science	*n*	*SD*	*M*
African American vs class size 399 and below	645	2.68	15.26
African American vs class size 400-599	344	2.83	15.72
African American vs class size 600 -899	330	2.89	16.90
African American vs class size 900 or more	95	3.12	18.69
White vs class size 399 and below	293	3.29	16.99
White vs class size 400-599	215	3.17	17.84
White vs class size 600 -899	326	3.66	18.86
White vs class size 900 or more	130	3.18	20.44
Other vs class size 399 and below	50	3.13	16.32
Other vs class size 400-599	48	3.50	16.50
Other vs class size 600 -899	49	3.07	18.69
Other vs class size 900 or more	16	3.92	20.44

In Table 19, the descriptive statistics for the Science reasoning ACT score by race and class size based on business and vocational programs resulted in the mean of each race increasing as the class size increased.

Table 20

Descriptive Statistics of Science ACT Score by Race and Class Size for College Preparatory Program

Science	*n*	*SD*	*M*
African American vs class size 399 and below	897	2.93	15.65
African American vs class size 400-599	776	2.98	16.70
African American vs class size 600 -899	1060	3.31	17.58
African American vs class size 900 or more	600	3.32	19.64
White vs class size 399 and below	88	3.31	17.85
White vs class size 400-599	89	3.40	18.94
White vs class size 600 -899	195	3.54	20.18
White vs class size 900 or more	249	4.13	23.04
Other vs class size 399 and below	562	3.33	17.02
Other vs class size 400-599	651	3.76	17.48
Other vs class size 600 -899	1630	3.81	20.02
Other vs class size 900 or more	2187	4.49	22.57

In Table 20, the descriptive statistics for the Science reasoning ACT score by race and class size based on college preparatory programs resulted in the mean of each race increasing as the class size increased.

Table 21

Descriptive Statistics of Science ACT Score by Race and Class Size for Other or General Program

Science	*n*	*SD*	*M*
African American vs class size 399 and below	757	3.11	15.34
African American vs class size 400-599	495	3.19	16.04
African American vs class size 600 -899	470	3.19	17.29
African American vs class size 900 or more	187	3.31	18.89
White vs class size 399 and below	114	3.32	17.01
White vs class size 400-599	62	3.52	18.17
White vs class size 600 -899	105	3.41	19.34
White vs class size 900 or more	65	3.63	21.68
Other vs class size 399 and below	793	3.47	16.80
Other vs class size 400-599	638	3.14	17.26
Other vs class size 600 -899	898	4.03	19.17
Other vs class size 900 or more	535	3.45	21.57

In Table 21, the descriptive statistics for the Science reasoning ACT score by race and class size based on other or general programs resulted in the mean of each race increasing as the class size increased.

Table 22 shows the relationships of the variables (race, class size, and program) in each area of English, mathematics, reading, and science reasoning using the ANOVA statistical test.

Table 22

Testing Differences in English, Math, Reading, and Science ACT Score by the Independent Variables, Race, Class Size and Program: Results of ANOVA

Index	MS	F-ratio	*P*
English			
Race	9708.49	521.25	.000*
Class Size	9755.52	523.77	.000*
Program	2035.62	109.29	.000*
Race* Class Size	55.44	2.98	.000*
Race*Program	76.09	4.09	.000*
Race*Class Size*Program	46.92	2.52	.000*
Math			
Race	4841.85	510.93	.000*
Class Size	3995.56	421.63	.000*
Program	653.56	68.97	.000*
Race* Class Size	147.96	15.61	.000*
Race*Program	75.89	8.01	.011*
Race*Class Size*Program	44.07	4.65	.012*
Reading			
Race	10350.02	523.47	.000*
Class Size	6897.90	348.87	.000*
Program	1385.75	70.09	.000*
Race* Class Size	80.85	4.09	.000*
Race*Program	64.22	3.25	.000*
Race*Class Size*Program	37.51	1.90	.006*
Science			
Race	5718.88	485.27	.000*
Class Size	3692.27	313.30	.000*
Program	625.36	53.06	.000*
Race* Class Size	51.28	4.35	.000*
Race*Program	63.56	5.39	.000*
Race*Class Size*Program	23.95	2.03	.006*

Note. * $p < .05$

There was a statistically significant difference at the .05 level among race in the English ACT sub-score, F (2,18) = 521.25, $p < .001$. There was a statistically significant

difference at the .05 level among the class sizes in the English ACT sub-score, F (3,18) = 523.77, $p < .001$. There was a statistically significant difference at the .05 level among programs in the English ACT sub-score, F (2,18) = 109.29, $p < .001$. There was a statistically significant interaction between race and class size in the English ACT sub-score, F (2,3) = 2.98, $p < .001$. There was a statistically significant interaction between race and program in the English ACT sub-score, F (2,2) = 4.09, $p < .001$. There was a statistically significant interaction among race, class size, and program in the English ACT sub-score, F (6,9) = 2.52, $p < .001$. Since there was a statistically significant interaction, a simple effects test was conducted.

Table 23

Simple Effects of English ACT Score by Race and Class Size based on High School Business & Vocational Programs

High school curriculum program	Race	Class Size	Mean difference	*P*
Business & Vocational	African American	399 and below vs 400-599	.89	.002*
		399 and below vs 600 -899	2.67	.000*
		399 and below vs 900 or more	5.25	.000*
		400-599 vs 600 -899	1.78	.000*
		400-599 vs 900 or more	4.36	.000*
		600-899 vs 900 or more	2.58	.000*
	White	399 and below vs 400-599	1.36	.000*
		399 and below vs 600 -899	3.26	.000*
		399 and below vs 900 or more	6.38	.000*
		400-599 vs 600 -899	1.90	.000*
		400-599 vs 900 or more	5.02	.000*
		600-899 vs 900 or more	3.12	.000*
	Other	399 and below vs 400-599	.99	.254
		399 and below vs 600 -899	3.25	.000*
		399 and below vs 900 or more	6.88	.000*
		400-599 vs 600 -899	2.26	.010*
		400-599 vs 900 or more	5.89	.000*
		600-899 vs 900 or more	3.83	.002*

Note. * $p < .05$

The simple effects test in Table 23 of English ACT sub-scores by race and class size based on high school Business & Vocational programs at a .05 level resulted in African Americans with a class size of 400-599 ($M = 14.17$, $SD = 3.53$, $n = 344$) having a statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below ($M = 13.28$, $SD = 3.36$, $n = 645$); African American with a class size of 600-899 ($M = 15.95$, $SD = 3.71$, $n = 330$) scored statistically significantly higher English ACT mean score than did those who graduated from the

class size of 399 and below (*M* = 13.28, *SD* = 3.36, *n* = 645) and the class size of 400-599 (*M* = 14.17, *SD* = 3.53, *n* = 344); African Americans with a class size of 900 or more (*M* = 18.53, *SD* = 4.47, *n* = 95) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* = 13.28, *SD* = 3.36, *n* = 645), 400-599 (*M* = 14.17, *SD* = 3.53, *n* = 344), and 600-899 (*M* = 15.95, *SD* = 3.71, *n* = 330); White with a class size of 400-599 (*M* = 16.53, *SD* = 4.26 *n* = 215) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.17, *SD* = 3.82, *n* = 293);White with a class size of 600-899 (*M* = 18.43, *SD* = 4.10, *n* = 326) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.17, *SD* = 3.82, *n* = 293) and the class size of 400-599 (*M* = 16.53, *SD* = 4.26 *n* = 215);White with a class size of 900 or more (*M* = 21.55, *SD* = 4.29, *n* = 130) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.17, *SD* = 3.82, *n* = 293), 400-599 (*M* = 16.53, *SD* = 4.26 *n* = 215), and 600-899 (*M* = 18.43, *SD* = 4.10, *n* = 326); Other with a class size of 400-599 (*M* = 15.35, *SD* = 3.75, *n* = 48) did not score statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.36, *SD* = 3.69, *n* = 50);Other with a class size of 600-899 (*M* = 17.61, *SD* = 4.39, *n* = 49) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.36, *SD* = 3.69, *n* = 50) and the class size of 400-599 (*M* = 15.35, *SD* = 3.75, *n* = 48);Other with a class size of 900 or more (*M* = 21.44, *SD* = 5.20, *n* = 16) scored

statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* = 14.36, *SD* = 3.69, *n* = 50), 400-599 (*M* = 15.35, *SD* = 3.75, *n* = 48), and 600-899 (*M* = 17.61, *SD* = 4.29, *n* = 49).

Table 24

Simple Effects of English ACT Score by Race and Class Size based on High School College Preparatory Programs

High school curriculum program	Race	Class Size	Mean difference	*p*
College Preparatory	African American	399 and below vs 400-599	1.62	.000*
		399 and below vs 600 -899	3.74	.000*
		399 and below vs 900 or more	7.40	.000*
		400-599 vs 600 -899	2.12	.000*
		400-599 vs 900 or more	5.78	.000*
		600-899 vs 900 or more	3.28	.000*
	White	399 and below vs 400-599	1.70	.020*
		399 and below vs 600 -899	3.82	.000*
		399 and below vs 900 or more	4.82	.000*
		400-599 vs 600 -899	2.12	.001*
		400-599 vs 900 or more	6.58	.000*
		600-899 vs 900 or more	4.46	.000*
	Other	399 and below vs 400-599	1.51	.000*
		399 and below vs 600 -899	3.76	.000*
		399 and below vs 900 or more	8.34	.000*
		400-599 vs 600 -899	2.27	.000*
		400-599 vs 900 or more	6.84	.000*
		600-899 vs 900 or more	4.57	.000*

Note. * p < .05

The simple effects test in Table 24 of English ACT sub-scores by race and class size based on college preparatory program at a .05 level resulted in African Americans with a class size of 400-599 (*M* = 15.75, *SD* = 3.72, *n* = 776) having a statistically

significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.13, *SD* = 3.58, *n* = 897); African American with a class size of 600-899 (*M* = 17.87, *SD* = 4.05, *n* = 1060) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.13, *SD* = 3.58, *n* = 897) and the class size of 400-599 (*M* = 15.75, *SD* = 3.72, *n* = 776); African Americans with a class size of 900 or more (*M* = 21.53, *SD* = 4.72, *n* = 600) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* = 14.13, *SD* = 3.58, *n* = 897), 400-599 (*M* = 15.75, *SD* = 3.72, *n* = 776), and 600-899 (*M* = 17.87, *SD* = 4.05, *n* = 1060); White with a class size of 400-599 (*M* = 18.90, *SD* = 4.43 *n* = 89) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.20, *SD* = 4.36, *n* = 88);White with a class size of 600-899 (*M* = 21.02, *SD* = 4.45, *n* = 195) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.20, *SD* = 4.36, *n* = 88) and the class size of 400-599 (*M* = 18.90, *SD* = 4.43, *n* = 89);White with a class size of 900 or more (*M* = 25.48, *SD* = 5.16, *n* = 249) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* = 17.20, *SD* = 4.36, *n* = 88), 400-599 (*M* = 18.90, *SD* = 4.43, *n* = 89), and 600-899 (*M* = 21.02, *SD* = 4.45, *n* = 195); Other with a class size of 400-599 (*M* = 17.58, *SD* = 5.03, *n* = 651) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.08, *SD* = 4.11, *n* = 562);Other with a class size of 600-899 (*M* = 19.85, *SD*

= 4.96, *n* = 1630) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.08, *SD* = 4.11, *n* = 562) and the class size of 400-599 (*M* = 17.58, *SD* = 5.03, *n* = 651);Other with a class size of 900 or more (*M* = 24.42, *SD* = 5.67, *n* = 2187) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.08, *SD* = 4.11, *n* = 562), 400-599 (*M* = 17.58, *SD* = 5.03, *n* = 651), and 600-899 (*M* = 19.85, *SD* = 4.96, *n* = 1630).

Table 25

Simple Effects of English ACT Score by Race and Class Size based on High School Other or General Programs

High school curriculum program	Race	Class Size	Mean difference	*p*
Other or General	African American	399 and below vs 400-599	1.45	.000*
		399 and below vs 600 -899	3.31	.000*
		399 and below vs 900 or more	6.64	.000*
		400-599 vs 600 -899	1.91	.000*
		400-599 vs 900 or more	5.2	.000*
		600-899 vs 900 or more	3.33	.000*
	White	399 and below vs 400-599	2.02	.000*
		399 and below vs 600 -899	3.89	.000*
		399 and below vs 900 or more	7.99	.000*
		400-599 vs 600 -899	1.87	.001*
		400-599 vs 900 or more	5.97	.000*
		600-899 vs 900 or more	4.1	.000*
	Other	399 and below vs 400-599	1.26	.065
		399 and below vs 600 -899	3.86	.000*
		399 and below vs 900 or more	6.93	.000*
		400-599 vs 600 -899	2.6	.000*
		400-599 vs 900 or more	5.64	.000*
		600-899 vs 900 or more	3.07	.000*

Note. * $p < .05$

The simple effects test in Table 25 of English ACT sub-scores by race and class size based on other or general programs at a .05 level resulted in African Americans with a class size of 400-599 (*M* = 15.17, *SD* = 3.82, *n* = 495) having a statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 13.72, *SD* = 3.60, *n* = 757); African American with a class size of 600-899 (*M* = 17.04, *SD* = 3.97, *n* = 470) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* =

13.72, *SD* = 3.60, *n* = 757) and the class size of 400-599 (*M* = 15.17, *SD* = 3.82, *n* = 495); African Americans with a class size of 900 or more (*M* = 20.37, *SD* = 4.55, *n* = 187) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* = 13.72, *SD* = 3.60, *n* = 757), 400-599 (*M* = 15.17, *SD* = 3.82, *n* = 495), and 600-899 (*M* = 17.04, *SD* = 3.97, *n* = 470); White with a class size of 400-599 (*M* = 16.75, *SD* = 4.26, *n* = 62) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.50, *SD* = 4.02, *n* = 114);White with a class size of 600-899 (*M* = 19.36, *SD* = 4.42, *n* = 105) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.50, *SD* = 4.02, *n* = 114) and the class size of 400-599 (*M* = 16.75, *SD* = 4.26, *n* = 62);White with a class size of 900 or more (*M* = 22.43, *SD* = 4.72, *n* = 65) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.50, *SD* = 4.02, *n* = 114), 400-599 (*M* = 16.75, *SD* = 4.26 *n* = 62), and 600-899 (*M* = 19.36, *SD* = 4.42, *n* = 105); Other with a class size of 400-599 (*M* = 16.76, *SD* = 4.60, *n* = 638) did not score statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.50, *SD* = 4.41, *n* = 793);Other with a class size of 600-899 (*M* = 19.36, *SD* = 4.96, *n* = 898) scored statistically significantly higher English ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.50, *SD* = 4.41, *n* = 793) and the class size of 400-599 (*M* = 16.76, *SD* = 4.60, *n* = 638);Other with a class size of 900 or more (*M* = 22.43, *SD* = 4.82, *n* = 535) scored statistically significantly

higher English ACT mean score than did those who graduated from the class size of 399 or below (M = 15.50, SD = 4.41, n = 793), 400-599 (M = 16.76, SD = 4.60, n = 638), and 600-899 (M = 19.36, SD = 4.96, n = 898).

There was a statistically significant difference at the .05 level among race in the Math ACT sub-score, F (2,18) = 510.93, p < .001. There was a statistically significant difference at the .05 level among the class sizes in the Math ACT sub-score, F (3,18) = 421.63, p < .001. There was a statistically significant difference at the .05 level among programs in the Math ACT sub-score, F (2,18) = 68.97, p < .001. There was a statistically significant interaction between race and class size in the Math ACT sub-score, F (2,3) = 15.61, p < .001. There was a statistically significant interaction between race and program in the Math ACT sub-score, F (2,2) = 8.01, p = .011. There was a statistically significant interaction among race, class size, and program in the Math ACT sub-score, F (6,9) = 4.65, p = .012. Since there was a statistically significant interaction, a simple effects test was conducted.

Table 26

Simple Effects of Math ACT Score by Race and Class Size based on High School Business & Vocational Programs

High school curriculum program	Race	Class Size	Mean difference	*p*
Business & Vocational	African American	399 and below vs 400-599	.61	.004*
		399 and below vs 600 -899	1.2	.000*
		399 and below vs 900 or more	2.92	.000*
		400-599 vs 600 -899	.61	.010*
		400-599 vs 900 or more	2.33	.000*
		600-899 vs 900 or more	1.72	.000*
	White	399 and below vs 400-599	1.00	.000*
		399 and below vs 600 -899	2.28	.000*
		399 and below vs 900 or more	3.95	.000*
		400-599 vs 600 -899	1.28	.000*
		400-599 vs 900 or more	2.95	.000*
		600-899 vs 900 or more	1.66	.000*
	Other	399 and below vs 400-599	.09	.891
		399 and below vs 600 -899	1.97	.002*
		399 and below vs 900 or more	3.95	.000*
		400-599 vs 600 -899	1.28	.003*
		400-599 vs 900 or more	2.94	.000*
		600-899 vs 900 or more	1.67	.001*

Note. * $p < .05$

The simple effects test on Table 26 of Math sub-scores by race and class size based on business and vocational programs at a .05 level resulted in African Americans with a class size of 400-599 (M = 15.13, SD = 1.96, n = 344) having a statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (M = 14.54, SD = 1.68, n = 645); African American with a class size of 600-899 (M = 15.74, SD = 2.15, n = 330) scored statistically significantly higher

Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.54, *SD* = 1.68, *n* = 645) and the class size of 400-599 (*M* = 15.13, *SD* = 1.96, *n* = 344); African Americans with a class size of 900 or more (*M* = 17.46, *SD* = 2.98, *n* = 95) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 14.54, *SD* = 1.68, *n* = 645), 400-599 (*M* = 15.13, *SD* = 1.96, *n* = 344), and 600-899 (*M* = 15.74, *SD* = 2.15, *n* = 330); White with a class size of 400-599 (*M* = 16.57, *SD* = 2.49, *n* = 215) did not score statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.57, *SD* = 1.87, *n* = 293);White with a class size of 600-899 (*M* = 17.85, *SD* = 3.00, *n* = 326) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.57, *SD* = 1.87, *n* = 293) and the class size of 400-599 (*M* = 16.57, *SD* = 2.49 *n* = 215);White with a class size of 900 or more (*M* = 19.52, *SD* = 3.49, *n* = 130) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.57, *SD* = 1.87, *n* = 293), 400-599 (*M* = 16.57, *SD* = 2.49, *n* = 215), and 600-899 (*M* = 17.85, *SD* = 3.00, *n* = 326); Other with a class size of 400-599 (*M* = 15.63, *SD* = 1.78, *n* = 48) did not score statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.54, *SD* = 2.14, *n* = 50);Other with a class size of 600-899 (*M* = 17.51, *SD* = 2.68, *n* = 49) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.54, *SD* = 2.14, *n* = 50) and the class size of 400-599 (*M* = 15.63, *SD* = 1.78, *n* = 48);Other with a

class size of 900 or more (*M* = 20.50, *SD* = 3.06, *n* = 16) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.54, *SD* = 2.14, *n* = 50), 400-599 (*M* = 15.63, *SD* = 1.78, *n* = 48), and 600-899 (*M* = 17.51, *SD* = 2.68, *n* = 49).

Table 27

Simple Effects of Math ACT Score by Race and Class Size based on High School College Preparatory Programs

High school curriculum program	Race	Class Size	Mean difference	*p*
College Preparatory	African American	399 and below vs 400-599	.65	.000*
		399 and below vs 600 -899	1.79	.000*
		399 and below vs 900 or more	3.94	.000*
		400-599 vs 600 -899	1.14	.000*
		400-599 vs 900 or more	3.29	.000*
		600-899 vs 900 or more	2.15	.000*
	White	399 and below vs 400-599	.73	.000*
		399 and below vs 600 -899	2.41	.000*
		399 and below vs 900 or more	5.89	.000*
		400-599 vs 600 -899	1.68	.000*
		400-599 vs 900 or more	5.17	.000*
		600-899 vs 900 or more	3.49	.000*
	Other	399 and below vs 400-599	1.01	.029*
		399 and below vs 600 -899	2.48	.000*
		399 and below vs 900 or more	6.31	.000*
		400-599 vs 600 -899	1.47	.000*
		400-599 vs 900 or more	5.3	.000*
		600-899 vs 900 or more	3.83	.000*

Note. * p < .05

The simple effects test on Table 27 of Math sub-scores by race and class size based on the college preparatory program at a .05 level resulted in African Americans with a class size of 400-599 (*M* = 15.53, *SD* = 2.02, *n* = 776) having a statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.88, *SD* = 1.79, *n* = 897); African American with a class size of 600-899 (*M* = 16.67, *SD* = 2.79, *n* = 1060) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.88, *SD* = 1.79, *n* = 897) and the class size of 400-599 (*M* = 15.53, *SD* = 2.02, *n* = 776); African Americans with a class size of 900 or more (*M* = 18.82, *SD* = 3.41, *n* = 600) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 14.88, *SD* = 1.79, *n* = 897), 400-599 (*M* = 15.53, *SD* = 2.02, *n* = 776), and 600-899 (*M* = 16.67, *SD* = 2.79, *n* = 1060); White with a class size of 400-599 (*M* = 17.41, *SD* = 2.82, *n* = 89) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.68, *SD* = 2.80, *n* = 88);White with a class size of 600-899 (*M* = 19.09, *SD* = 3.60, *n* = 195) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.68, *SD* = 2.80, *n* = 88) and the class size of 400-599 (*M* = 17.41, *SD* = 2.82, *n* = 89);White with a class size of 900 or more (*M* = 22.58, *SD* = 4.51, *n* = 249) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.68, *SD* = 2.80, *n* = 88), 400-599 (*M* = 17.41, *SD* = 2.82, *n* = 89), and 600-899 (*M* = 19.09, *SD* = 3.60, *n* = 195); Other with a class size of 400-599 (*M*

= 16.98, *SD* = 3.27, *n* =651) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.97, *SD* = 2.30, *n* = 562);Other with a class size of 600-899 (*M* = 18.45, *SD* = 3.88, *n* = 1630) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.97, *SD* = 2.30, *n* = 562) and the class size of 400-599 (*M* = 16.98, *SD* = 3.27, *n* = 651);Other with a class size of 900 or more (*M* = 22.28, *SD* = 4.66, *n* = 2187) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.97, *SD* = 2.30, *n* = 562), 400-599 (*M* = 16.98, *SD* = 3.27, *n* = 651), and 600-899 (*M* = 18.45, *SD* = 3.88, *n* = 1630).

Table 28

Simple Effects of Math ACT Score by Race and Class Size based on Other or General Programs

High school curriculum program	Race	Class Size	Mean difference	*p*
Other or General	African American	399 and below vs 400-599	.44	.014*
		399 and below vs 600 -899	1.26	.000*
		399 and below vs 900 or more	3.19	.000*
		400-599 vs 600 -899	.82	.000*
		400-599 vs 900 or more	2.75	.000*
		600-899 vs 900 or more	1.93	.000*
	White	399 and below vs 400-599	.88	.000*
		399 and below vs 600 -899	2.18	.000*
		399 and below vs 900 or more	4.96	.000*
		400-599 vs 600 -899	1.3	.000*
		400-599 vs 900 or more	4.08	.000*
		600-899 vs 900 or more	2.78	.000*
	Other	399 and below vs 400-599	.39	.423
		399 and below vs 600 -899	2.21	.000*
		399 and below vs 900 or more	5.17	.000*
		400-599 vs 600 -899	1.82	.000*
		400-599 vs 900 or more	2.96	.000*
		600-899 vs 900 or more	2.96	.000*

Note. * $p < .05$

The simple effects test on Table 28 of Math sub-scores by race and class size based on other or general programs at a .05 level resulted in African Americans with a class size of 400-599 ($M = 15.20$, $SD = 2.04$, $n = 495$) having a statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below ($M = 14.76$, $SD = 1.89$, $n = 757$); African American with a class size of 600-899 ($M = 16.02$, $SD = 2.44$, $n = 470$) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below ($M =$

14.76, *SD* = 1.89, *n* = 757) and the class size of 400-599 (*M* = 15.20, *SD* = 2.04, *n* = 495); African Americans with a class size of 900 or more (*M* = 17.74, *SD* = 2.97, *n* = 187) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 14.76, *SD* = 1.89, *n* = 757), 400-599 (*M* = 15.20, *SD* = 2.04, *n* = 495), and 600-899 (*M* = 16.02, *SD* = 2.44, *n* = 470); White with a class size of 400-599 (*M* = 16.81, *SD* = 2.73, *n* = 62) did not score statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.92, *SD* = 2.26, *n* = 114);White with a class size of 600-899 (*M* = 18.11, *SD* = 3.15, *n* = 105) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.92, *SD* = 2.26, *n* = 114) and the class size of 400-599 (*M* = 16.81, *SD* = 2.73 *n* = 62);White with a class size of 900 or more (*M* = 20.89, *SD* = 3.86, *n* = 65) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.92, *SD* = 2.26, *n* = 114), 400-599 (*M* = 16.81, *SD* = 2.73, *n* = 62), and 600-899 (*M* = 18.11, *SD* = 3.15, *n* = 105); Other with a class size of 400-599 (*M* = 16.16, *SD* = 2.40, *n* = 638) did not score statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.77, *SD* = 2.42, *n* = 793); Other with a class size of 600-899 (*M* = 17.98, *SD* = 3.50, *n* = 898) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.77, *SD* = 2.42, *n* = 793) and the class size of 400-599 (*M* = 16.16, *SD* = 2.40, *n* = 638);Other with a class size of 900 or more (*M* = 20.94, *SD* = 3.84, *n* = 535) scored statistically significantly

higher Math ACT mean score than did those who graduated from the class size of 399 or below (M = 15.77, SD = 2.42, n = 793), 400-599 (M = 16.16, SD = 2.40, n = 638), and 600-899 (M = 17.98, SD = 3.50, n = 898).

There was a statistically significant difference at the .05 level among race in the Reading ACT sub-score, F (2,18) = 523.47, p < .001. There was a statistically significant difference at the .05 level among the class sizes in the Reading ACT sub-score, F (3,18) = 348.87, p < .001. There was a statistically significant difference at the .05 level among programs in the Reading ACT sub-score, F (2,18) = 70.09, p < .001. There was a statistically significant interaction between race and class size in the Reading ACT sub-score, F (2,3) = 4.09, p < .001. There was a statistically significant interaction between race and program in the Reading ACT sub-score, F (2,2) = 3.25, p < .001. There was a statistically significant interaction among race, class size, and program in the Reading ACT sub-score, F (6,9) = 1.90, p = .006. Since there was a statistically significant interaction, a simple effects test was conducted.

Table 29

Simple Effects of Reading ACT Score by Race and Class Size based on Business & Vocational Programs

High school curriculum program	Race	Class Size	Mean difference	*p*
Business & Vocational	African American	399 and below vs 400-599	.79	.006*
		399 and below vs 600 -899	1.85	.000*
		399 and below vs 900 or more	4.17	.000*
		400-599 vs 600 -899	1.04	.002*
		400-599 vs 900 or more	3.46	.000*
		600-899 vs 900 or more	2.42	.000*
	White	399 and below vs 400-599	1.31	.001*
		399 and below vs 600 -899	2.68	.000*
		399 and below vs 900 or more	5.25	.000*
		400-599 vs 600 -899	1.38	.000*
		400-599 vs 900 or more	3.95	.000*
		600-899 vs 900 or more	2.57	.000*
	Other	399 and below vs 400-599	.92	.305
		399 and below vs 600 -899	2.74	.002*
		399 and below vs 900 or more	7.32	.000*
		400-599 vs 600 -899	1.82	.044*
		400-599 vs 900 or more	1.81	.000*
		600-899 vs 900 or more	4.55	.000*

Note. * $p < .05$

The simple effects test on Table 29 of Reading sub-scores by race and class size based on business and vocational programs at a .05 level resulted in African Americans with a class size of 400-599 (M = 14.85, SD = 3.53, n = 344) having a statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (M = 14.04, SD = 3.36, n = 645); African American with a class size of 600-899 (M = 15.89, SD = 3.71, n = 330) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399

and below (*M* = 14.04, *SD* = 3.36, *n* = 645) and the class size of 400-599 (*M* = 14.85, *SD* = 3.53, *n* = 344); African Americans with a class size of 900 or more (*M* = 18.31, *SD* = 4.47, *n* = 95) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 14.04, *SD* = 3.36, *n* = 645), 400-599 (*M* = 14.85, *SD* = 3.53, *n* = 344), and 600-899 (*M* = 15.89, *SD* = 3.71, *n* = 330); White with a class size of 400-599 (*M* = 16.02, *SD* = 4.23, *n* = 215) did not score statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.74, *SD* = 3.86, *n* = 293);White with a class size of 600-899 (*M* = 17.58, *SD* = 4.30, *n* = 326) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.74, *SD* = 3.86, *n* = 293) and the class size of 400-599 (*M* = 16.02, *SD* = 4.23 *n* = 215);White with a class size of 900 or more (*M* = 20.48, *SD* = 5.27, *n* = 130) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 14.74, *SD* = 3.86, *n* = 293), 400-599 (*M* = 16.02, *SD* = 4.23, *n* = 215), and 600-899 (*M* = 17.58, *SD* = 4.30, *n* = 326); Other with a class size of 400-599 (*M* = 16.04, *SD* = 3.44, *n* = 48) did not score statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.12, *SD* = 3.11, *n* = 50);Other with a class size of 600-899 (*M* = 17.86, *SD* = 4.55, *n* = 49) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.12, *SD* = 3.11, *n* = 50) and the class size of 400-599 (*M* = 16.04, *SD* = 3.44, *n* = 48);Other with a class size of 900 or more (*M* = 22.44, *SD* = 4.76, *n* = 16) scored

statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.12, *SD* = 3.11, *n* = 50), 400-599 (*M* = 16.04, *SD* = 3.44, *n* = 48), and 600-899 (*M* = 17.86, *SD* = 4.55, *n* = 49).

Table 30

Simple Effects of Reading ACT Score by Race and Class Size based on College Preparatory Programs

High school curriculum program	Race	Class Size	Mean difference	*p*
College Preparatory	African American	399 and below vs 400-599	1.28	.000*
		399 and below vs 600 -899	2.84	.000*
		399 and below vs 900 or more	5.74	.000*
		400-599 vs 600 -899	1.56	.000*
		400-599 vs 900 or more	4.46	.000*
		600-899 vs 900 or more	2.90	.000*
	White	399 and below vs 400-599	1.44	.020*
		399 and below vs 600 -899	3.23	.000*
		399 and below vs 900 or more	7.1	.000*
		400-599 vs 600 -899	1.79	.001*
		400-599 vs 900 or more	5.66	.000*
		600-899 vs 900 or more	3.87	.000*
	Other	399 and below vs 400-599	1.35	.044*
		399 and below vs 600 -899	3.06	.000*
		399 and below vs 900 or more	7.37	.000*
		400-599 vs 600 -899	1.71	.003*
		400-599 vs 900 or more	6.02	.000*
		600-899 vs 900 or more	4.31	.000*

Note. * $p < .05$

The simple effects test on Table 30 of Reading sub-scores by race and class size based on college preparatory programs at a .05 level resulted in African Americans with a class size of 400-599 (*M* = 16.02, *SD* = 3.72, *n* = 776) having a statistically significantly

higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.74, *SD* = 3.58, *n* = 897); African American with a class size of 600-899 (*M* = 17.58, *SD* = 4.05, *n* = 1060) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.74, *SD* = 3.58, *n* = 897) and the class size of 400-599 (*M* = 16.02, *SD* = 3.72, *n* = 776); African Americans with a class size of 900 or more (*M* = 20.48, *SD* = 4.72, *n* = 600) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 14.74, *SD* = 3.58, *n* = 897), 400-599 (*M* = 16.02, *SD* = 3.72, *n* = 776), and 600-899 (*M* = 17.58, *SD* = 4.05, *n* = 1060); White with a class size of 400-599 (*M* = 19.08, *SD* = 4.43, *n* = 89) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.64, *SD* = 4.36, *n* = 88); White with a class size of 600-899 (*M* = 20.87, *SD* = 4.45, *n* = 195) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.64, *SD* = 4.36, *n* = 88) and the class size of 400-599 (*M* = 19.08, *SD* = 4.43 *n* = 89);White with a class size of 900 or more (*M* = 24.74, *SD* = 5.16, *n* = 249) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 17.64, *SD* = 4.36, *n* = 88), 400-599 (*M* = 19.08, *SD* = 4.43, *n* = 89), and 600-899 (*M* = 20.87, *SD* = 4.45, *n* = 195); Other with a class size of 400-599 (*M* = 18.24, *SD* = 5.03, *n* = 651) did not score statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.89, *SD* = 4.11, *n* = 562);Other with a class size of 600-899 (*M* = 19.95, *SD*

= 4.96, *n* = 1630) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.89, *SD* = 4.11, *n* = 562) and the class size of 400-599 (*M* = 18.24, *SD* = 5.03, *n* = 651);Other with a class size of 900 or more (*M* = 24.26, *SD* = 5.67, *n* = 2187) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.89, *SD* = 4.11, *n* = 562), 400-599 (*M* = 18.24, *SD* = 5.03, *n* = 651), and 600-899 (*M* = 19.95, *SD* = 4.96, *n* = 1630).

Table 31

Simple Effects of Reading ACT Score by Race and Class Size based on Other or General Programs

High school curriculum program	Race	Class Size	Mean difference	*p*
Other or General	African American	399 and below vs 400-599	1.09	.000*
		399 and below vs 600 -899	2.24	.000*
		399 and below vs 900 or more	5.47	.000*
		400-599 vs 600 -899	1.15	.000*
		400-599 vs 900 or more	4.38	.000*
		600-899 vs 900 or more	3.23	.000*
	White	399 and below vs 400-599	1.34	.000*
		399 and below vs 600 -899	2.99	.000*
		399 and below vs 900 or more	6.29	.000*
		400-599 vs 600 -899	1.65	.000*
		400-599 vs 900 or more	4.95	.000*
		600-899 vs 900 or more	3.3	.000*
	Other	399 and below vs 400-599	.72	.308
		399 and below vs 600 -899	2.5	.000*
		399 and below vs 900 or more	6.2	.000*
		400-599 vs 600 -899	1.78	.012*
		400-599 vs 900 or more	5.48	.000*
		600-899 vs 900 or more	3.7	.000*

Note. * p < .05

The simple effects test on Table 31 of Reading sub-scores by race and class size based on other or general programs at a .05 level resulted in African Americans with a class size of 400-599 (*M* = 15.52, *SD* = 3.44, *n* = 495) having a statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.43, *SD* = 3.02, *n* = 757); African American with a class size of 600-899 (*M* = 16.67, *SD* = 3.94, *n* = 470) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.43, *SD* = 3.02, *n* = 757) and the class size of 400-599 (*M* = 15.52, *SD* = 3.44, *n* = 495); African Americans with a class size of 900 or more (*M* = 19.90, *SD* = 4.55, *n* = 187) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 14.43, *SD* = 3.02, *n* = 757), 400-599 (*M* = 15.52, *SD* = 3.44, *n* = 495), and 600-899 (*M* = 16.67, *SD* = 3.94, *n* = 470); White with a class size of 400-599 (*M* = 18.28, *SD* = 4.45, *n* = 62) did not score statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.95, *SD* = 4.18, *n* = 114);White with a class size of 600-899 (*M* = 19.94, *SD* = 4.76, *n* = 105) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.95, *SD* = 4.18, *n* = 114) and the class size of 400-599 (*M* = 18.28, *SD* = 4.45 *n* = 62);White with a class size of 900 or more (*M* = 23.24, *SD* = 5.17, *n* = 65) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.95, *SD* = 4.18, *n* = 114), 400-599 (*M* = 18.28, *SD* = 4.45, *n* = 62), and 600-899 (*M* = 19.94, *SD* = 4.76, *n* = 105); Other with a class size

of 400-599 (*M* = 17.34, *SD* = 4.45, *n* = 638) did not score statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.62, *SD* = 4.11, *n* = 793);Other with a class size of 600-899 (*M* = 19.12, *SD* = 4.98, *n* = 898) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.62, *SD* = 4.11, *n* = 793) and the class size of 400-599 (*M* = 17.34, *SD* = 4.45, *n* = 638);Other with a class size of 900 or more (*M* = 22.81, *SD* = 5.23, *n* = 535) scored statistically significantly higher Reading ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.62, *SD* = 4.11, *n* = 793), 400-599 (*M* = 17.34, *SD* = 4.45, *n* = 638), and 600-899 (*M* = 19.12, *SD* = 4.98, *n* = 898).

There was a statistically significant difference at the .05 level among race in the Science reasoning ACT sub-score, F (2,18) = 485.27, $p < .001$. There was a statistically significant difference at the .05 level among the class sizes in the Science reasoning ACT sub-score, F (3,18) = 313.30, $p < .001$. There was a statistically significant difference at the .05 level among programs in the Science reasoning ACT sub-score, F (2,18) = 53.06, $p < .001$. There was a statistically significant interaction between race and class size in the Science reasoning ACT sub-score, F (2,3) = 4.35, $p < .001$. There was a statistically significant interaction between race and program in the Science reasoning ACT sub-score, F (2,2) = 5.39, $p < .001$. There was a statistically significant interaction among race, class size, and program in the Science reasoning ACT sub-score, F (6,9) = 2.03, $p = .006$. Since there was a statistically significant interaction, a simple effects test was conducted.

Table 32

Simple Effects of Science ACT Score by Race and Class Size based on Business & Vocational Programs

High school curriculum program	Race	Class Size	Mean difference	*p*
Business & Vocational	African American	399 and below vs 400-599	.46	.044*
		399 and below vs 600 -899	1.64	.000*
		399 and below vs 900 or more	3.43	.000*
		400-599 vs 600 -899	1.18	.000*
		400-599 vs 900 or more	2.97	.000*
		600-899 vs 900 or more	1.79	.000*
	White	399 and below vs 400-599	1.09	.000*
		399 and below vs 600 -899	2.33	.000*
		399 and below vs 900 or more	5.19	.000*
		400-599 vs 600 -899	1.24	.001*
		400-599 vs 900 or more	4.1	.000*
		600-899 vs 900 or more	2.86	.000*
	Other	399 and below vs 400-599	.18	.795
		399 and below vs 600 -899	2.37	.001*
		399 and below vs 900 or more	4.12	.000*
		400-599 vs 600 -899	2.19	.002*
		400-599 vs 900 or more	3.94	.000*
		600-899 vs 900 or more	2.55	.078

Note. * $p < .05$

The simple effects test on Table 32 of Science reasoning sub-scores by race and class size based on business and vocational programs at a .05 level resulted in African Americans with a class size of 400-599 ($M = 15.72$, $SD = 2.83$, $n = 344$) having a statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below ($M = 15.26$, $SD = 2.68$, $n = 645$); African

American with a class size of 600-899 (*M* = 16.90, *SD* = 2.89, *n* = 330) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.26, *SD* = 2.68, *n* = 645) and the class size of 400-599 (*M* = 15.72, *SD* = 2.83, *n* = 344); African Americans with a class size of 900 or more (*M* = 18.69, *SD* = 3.12, *n* = 95) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.26, *SD* = 2.68, *n* = 645), 400-599 (*M* = 15.72, *SD* = 2.83, *n* = 344), and 600-899 (*M* = 16.90, *SD* = 2.89, *n* = 330); White with a class size of 400-599 (*M* = 17.84, *SD* = 3.17, *n* = 215) did not score statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.99, *SD* = 3.29, *n* = 293);White with a class size of 600-899 (*M* = 18.86, *SD* = 3.66, *n* = 326) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.99, *SD* = 3.29, *n* = 293) and the class size of 400-599 (*M* = 17.84, *SD* = 3.17 *n* = 215);White with a class size of 900 or more (*M* = 20.44, *SD* = 3.18, *n* = 130) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.99, *SD* = 3.29, *n* = 293), 400-599 (*M* = 17.84, *SD* = 3.17, *n* = 215), and 600-899 (*M* = 18.86, *SD* = 3.66, *n* = 326); Other with a class size of 400-599 (*M* = 16.50, *SD* = 3.50, *n* = 48) did not score statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.32, *SD* = 3.13, *n* = 50);Other with a class size of 600-899 (*M* = 18.69, *SD* = 3.07, *n* = 49) scored statistically significantly higher Science reasoning

ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.32, *SD* = 3.13, *n* = 50) and the class size of 400-599 (*M* = 16.50, *SD* = 3.50, *n* = 48);Other with a class size of 900 or more (*M* = 20.44, *SD* = 3.92, *n* = 16) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.32, *SD* = 3.13, *n* = 50), 400-599 (*M* = 16.50, *SD* = 3.50, *n* = 48), and 600-899 (*M* = 18.69, *SD* = 3.07, *n* = 49).

Table 33

Simple Effects of Science ACT Score by Race and Class Size based on College Preparatory programs

High school curriculum program	Race	Class Size	Mean difference	*p*
College Preparatory	African American	399 and below vs 400-599	1.05	.000*
		399 and below vs 600 -899	1.93	.000*
		399 and below vs 900 or more	3.99	.000*
		400-599 vs 600 -899	.87	.000*
		400-599 vs 900 or more	2.94	.000*
		600-899 vs 900 or more	2.06	.000*
	White	399 and below vs 400-599	1.36	.000*
		399 and below vs 600 -899	2.33	.000*
		399 and below vs 900 or more	5.19	.000*
		400-599 vs 600 -899	1.24	.000*
		400-599 vs 900 or more	4.1	.000*
		600-899 vs 900 or more	2.86	.000*
	Other	399 and below vs 400-599	.46	.372*
		399 and below vs 600 -899	3.00	.000*
		399 and below vs 900 or more	5.55	.000*
		400-599 vs 600 -899	2.54	.000*
		400-599 vs 900 or more	5.09	.000*
		600-899 vs 900 or more	2.55	.000*

Note. * p < .05

The simple effects test on Table 33 of Science reasoning sub-scores by race and class size based on college preparatory programs at a .05 level resulted in African Americans with a class size of 400-599 (*M* = 16.70, *SD* = 2.98, *n* = 776) having a statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.65, *SD* = 2.93, *n* = 897); African American with a class size of 600-899 (*M* = 17.58, *SD* = 3.31, *n* = 1060) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.65, *SD* = 2.93, *n* = 897) and the class size of 400-599 (*M* = 16.70, *SD* = 2.98, *n* = 776); African Americans with a class size of 900 or more (*M* = 19.64, *SD* = 3.32, *n* = 600) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.65, *SD* = 2.93, *n* = 897), 400-599 (*M* = 16.70, *SD* = 2.98, *n* = 776), and 600-899 (*M* = 17.58, *SD* = 3.31, *n* = 1060); White with a class size of 400-599 (*M* = 18.94, *SD* = 3.40, *n* = 89) did not score statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.85, *SD* = 3.31, *n* = 88);White with a class size of 600-899 (*M* = 20.18, *SD* = 3.54, *n* = 195) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.85, *SD* = 3.31, *n* = 88) and the class size of 400-599 (*M* = 18.94, *SD* = 3.40, *n* = 89);White with a class size of 900 or more (*M* = 23.04, *SD* = 4.13, *n* = 249) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 17.85, *SD* = 3.31, *n* = 88), 400-599 (*M* = 18.94,

SD = 3.40, *n* = 89), and 600-899 (*M* = 20.18, *SD* = 3.54, *n* = 195); Other with a class size of 400-599 (*M* = 17.48, *SD* = 3.76, *n* = 651) did not score statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.02, *SD* = 3.33, *n* = 651);Other with a class size of 600-899 (*M* = 20.02, *SD* = 3.81, *n* = 1630) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.02, *SD* = 3.33, *n* = 562) and the class size of 400-599 (*M* = 17.48, *SD* = 3.76, *n* = 651);Other with a class size of 900 or more (*M* = 22.57, *SD* = 4.49, *n* = 2187) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 17.02, *SD* = 3.33, *n* = 562), 400-599 (*M* = 17.48, *SD* = 3.76, *n* = 651), and 600-899 (*M* = 20.02, *SD* = 3.81, *n* = 1630).

Table 34

Simple Effects of Science ACT Score by Race and Class Size based on Other or General Programs

High school curriculum program	Race	Class Size	Mean difference	*p*
Other or General	African American	399 and below vs 400-599	.70	.001*
		399 and below vs 600 -899	1.95	.000*
		399 and below vs 900 or more	3.55	.000*
		400-599 vs 600 -899	1.25	.000*
		400-599 vs 900 or more	2.85	.000*
		600-899 vs 900 or more	1.6	.000*
	White	399 and below vs 400-599	1.16	.000*
		399 and below vs 600 -899	2.33	.000*
		399 and below vs 900 or more	4.67	.000*
		400-599 vs 600 -899	1.16	.000*
		400-599 vs 900 or more	3.5	.000*
		600-899 vs 900 or more	2.34	.000*
	Other	399 and below vs 400-599	.46	.396
		399 and below vs 600 -899	2.37	.000*
		399 and below vs 900 or more	4.77	.000*
		400-599 vs 600 -899	1.91	.001*
		400-599 vs 900 or more	4.31	.000*
		600-899 vs 900 or more	2.4	.000*

Note. * $p < .05$

The simple effects test on Table 34 of Science reasoning sub-scores by race and class size based on other or general programs at a .05 level resulted in African Americans with a class size of 400-599 (M = 16.04, SD = 3.19, n = 495) having a statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (M = 15.34, SD = 3.11, n = 757); African American with a class size of 600-899 (M = 17.29, SD = 3.19, n = 470) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated

from the class size of 399 and below (*M* = 15.34, *SD* = 3.11, *n* = 757) and the class size of 400-599 (*M* = 16.04, *SD* = 3.19, *n* = 495); African Americans with a class size of 900 or more (*M* = 18.89, *SD* = 3.31, *n* = 187) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.34, *SD* = 3.11, *n* = 757), 400-599 (*M* = 16.04, *SD* = 3.19, *n* = 495), and 600-899 (*M* = 17.29, *SD* = 3.19, *n* = 470); White with a class size of 400-599 (*M* = 18.17, *SD* = 3.52, *n* = 62) did not score statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.01, *SD* = 3.32, *n* = 114);White with a class size of 600-899 (*M* = 19.34, *SD* = 3.41, *n* = 105) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.01, *SD* = 3.32, *n* = 114) and the class size of 400-599 (*M* = 18.17, *SD* = 3.52 *n* = 62);White with a class size of 900 or more (*M* = 21.68, *SD* = 3.63, *n* = 65) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 17.01, *SD* = 3.32, *n* = 114), 400-599 (*M* = 18.17, *SD* = 3.52, *n* = 62), and 600-899 (*M* = 19.34, *SD* = 3.41, *n* = 105); Other with a class size of 400-599 (*M* = 17.26, *SD* = 3.14, *n* = 638) did not score statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.80, *SD* = 3.47, *n* = 793);Other with a class size of 600-899 (*M* = 19.17, *SD* = 4.03, *n* = 898) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.80, *SD* = 3.47, *n* = 793) and the class size of 400-599 (*M* = 17.26, *SD* = 3.14, *n* = 638);Other

with a class size of 900 or more (M = 21.57, SD = 3.45, n = 535) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (M = 16.80, SD = 3.47, n = 793), 400-599 (M = 17.26, SD = 3.14, n = 638), and 600-899 (M = 19.17, SD = 4.03, n = 898).

Research Question 3

Research question 3 asks is there a statistically significant difference in the mean 2005 ACT sub-scale scores between males and females, controlled for ethnicity (African American/Black, Caucasion-American/White, and other students), who graduated from schools with graduating class of 900 or more, 600-899, 400-599, and 399 or below in Mississippi? The dependent variables are the ACT mathematics, English, reading and science reasoning sub-scale scores. The SPSS statistical program was first used to examine the descriptive statistics of the variables.

A stratified random sample (n = 16779) was taken from the population of students taking the 2005 ACT in Mississippi. This stratified random sample represents the population of students that responded to Section E on the students profile section of the questionnaire:

> Section E on ACT Registration Folder
> Indicate gender:
> Male
> Female

Four ACT subtest areas are represented: (a) English, (b) mathematics, (c) reading, and (d) science reasoning. The data were analyzed for descriptives and then with the Analysis of Variance (ANOVA) for the statistically significant differences.

Table 35

Descriptive Statistics of English ACT Score by Race and Class Size for Male

English	*n*	*SD*	*M*
African American vs class size 399 and below	1187	3.60	13.64
African American vs class size 400-599	678	3.98	14.90
African American vs class size 600 -899	637	4.14	17.26
African American vs class size 900 or more	199	4.81	20.67
White vs class size 399 and below	122	4.34	15.16
White vs class size 400-599	79	4.67	16.65
White vs class size 600 -899	149	5.27	19.81
White vs class size 900 or more	119	5.72	24.13
Other vs class size 399 and below	915	4.24	16.16
Other vs class size 400-599	697	4.57	18.01
Other vs class size 600 -899	1243	4.77	20.48
Other vs class size 900 or more	1000	5.36	25.08

In Table 35, the descriptive statistics for the English ACT score by race and class size for males resulted in the mean of each race increasing as the class size increased with males.

Table 36

Descriptive Statistics of English ACT Score by Race and Class Size for Female

English	*n*	*SD*	*M*
African American vs class size 399 and below	1135	3.48	13.88
African American vs class size 400-599	945	3.57	15.46
African American vs class size 600 -899	1240	3.98	17.34
African American vs class size 900 or more	689	4.74	21.07
White vs class size 399 and below	130	4.02	15.82
White vs class size 400-599	121	4.67	16.88
White vs class size 600 -899	204	4.59	19.05
White vs class size 900 or more	213	5.51	23.77
Other vs class size 399 and below	742	4.12	16.48
Other vs class size 400-599	813	4.26	18.35
Other vs class size 600 -899	1628	4.26	20.30
Other vs class size 900 or more	1866	5.00	25.00

In Table 36, the descriptive statistics for the English ACT score by race and class size for females resulted in the mean of each race increasing as the class size increased with females.

Table 37

Descriptive Statistics of Math ACT Score by Race and Class Size for Male

Math	*n*	*SD*	*M*
African American vs class size 399 and below	1187	1.84	15.04
African American vs class size 400-599	678	2.21	15.67
African American vs class size 600 -899	637	2.98	17.01
African American vs class size 900 or more	199	3.85	19.63
White vs class size 399 and below	122	2.50	16.07
White vs class size 400-599	79	3.23	16.78
White vs class size 600 -899	149	3.89	19.37
White vs class size 900 or more	119	4.47	23.35
Other vs class size 399 and below	915	2.71	16.56
Other vs class size 400-599	697	3.07	17.68
Other vs class size 600 -899	1243	3.79	19.84
Other vs class size 900 or more	1000	4.71	23.75

In Table 37, the descriptive statistics for the Math ACT score by race and class size for males resulted in the mean of each race increasing as the class size increased with males.

Table 38

Descriptive Statistics of Math ACT Score by Race and Class Size for Female

Math	*n*	*SD*	*M*
African American vs class size 399 and below	1135	1.70	14.45
African American vs class size 400-599	945	1.84	15.10
African American vs class size 600 -899	1240	2.34	15.98
African American vs class size 900 or more	689	3.09	18.18
White vs class size 399 and below	130	2.13	15.52
White vs class size 400-599	121	2.39	16.11
White vs class size 600 -899	204	3.14	17.26
White vs class size 900 or more	213	4.30	21.13
Other vs class size 399 and below	742	1.97	15.61
Other vs class size 400-599	813	2.33	16.48
Other vs class size 600 -899	1628	2.81	17.73
Other vs class size 900 or more	1866	4.03	21.26

In Table 38, the descriptive statistics for the Math ACT score by race and class size for females resulted in the mean of each race increasing as the class size increased with females.

Table 39

Descriptive Statistics of Reading ACT Score by Race and Class Size for Male

Reading	*n*	*SD*	*M*
African American vs class size 399 and below	1187	3.08	14.30
African American vs class size 400-599	678	3.69	15.51
African American vs class size 600 -899	637	4.12	17.02
African American vs class size 900 or more	199	5.09	20.12
White vs class size 399 and below	122	3.98	16.50
White vs class size 400-599	79	4.36	17.70
White vs class size 600 -899	149	5.48	19.67
White vs class size 900 or more	119	5.96	24.44
Other vs class size 399 and below	915	4.41	17.08
Other vs class size 400-599	697	4.72	18.43
Other vs class size 600 -899	1243	5.19	20.69
Other vs class size 900 or more	1000	5.82	24.30

In Table 39, the descriptive statistics for the Reading ACT score by race and class size for males resulted in the mean of each race increasing as the class size increased with males.

Table 40

Descriptive Statistics of Reading ACT Score by Race and Class Size for Female

Science	*n*	*SD*	*M*
African American vs class size 399 and below	1135	2.86	14.60
African American vs class size 400-599	945	3.35	15.68
African American vs class size 600 -899	1240	4.06	17.07
African American vs class size 900 or more	689	4.75	20.16
White vs class size 399 and below	130	4.05	16.41
White vs class size 400-599	121	4.45	17.20
White vs class size 600 -899	204	4.92	19.17
White vs class size 900 or more	213	5.82	23.55
Other vs class size 399 and below	742	4.05	17.01
Other vs class size 400-599	813	4.43	18.54
Other vs class size 600 -899	1628	4.59	20.06
Other vs class size 900 or more	1866	5.37	24.28

In Table 40, the descriptive statistics for the Reading ACT score by race and class size for females resulted in the mean of each race increasing as the class size increased with females.

Table 41

Descriptive Statistics of Science ACT Score by Race and Class Size for Male

Reading	*n*	*SD*	*M*
African American vs class size 399 and below	1187	2.86	15.68
African American vs class size 400-599	678	2.92	16.57
African American vs class size 600 -899	637	3.10	18.05
African American vs class size 900 or more	199	3.32	20.39
White vs class size 399 and below	122	3.09	17.48
White vs class size 400-599	79	3.52	18.06
White vs class size 600 -899	149	3.31	20.83
White vs class size 900 or more	119	4.06	23.47
Other vs class size 399 and below	915	3.02	17.87
Other vs class size 400-599	697	3.17	19.18
Other vs class size 600 -899	1243	3.15	20.83
Other vs class size 900 or more	1000	3.69	24.06

In Table 41, the descriptive statistics for the Science reasoning ACT score by race and class size for males resulted in the mean of each race increasing as the class size increased with males.

Table 42

Descriptive Statistics of Science ACT Score by Race and Class Size for Female

Science	*n*	*SD*	*M*
African American vs class size 399 and below	1135	2.86	15.19
African American vs class size 400-599	945	2.92	16.08
African American vs class size 600 -899	1240	3.10	17.04
African American vs class size 900 or more	689	3.32	19.10
White vs class size 399 and below	130	3.09	16.16
White vs class size 400-599	121	3.52	16.59
White vs class size 600 -899	204	3.31	18.64
White vs class size 900 or more	213	4.06	21.62
Other vs class size 399 and below	742	3.02	16.61
Other vs class size 400-599	813	3.17	17.85
Other vs class size 600 -899	1628	3.15	18.95
Other vs class size 900 or more	1866	3.69	21.93

In Table 42, the descriptive statistics for the Science reasoning ACT score by race and class size for females resulted in the mean of each race increasing as the class size increased with females.

The following Table 43 shows the relationships of the variables (race, class size, and gender) in each area of English, mathematics, reading, and science reasoning using the ANOVA statistical test.

Table 43

Testing Differences in English, Math, Reading, and Science ACT Score by the Independent Variables, Race, Class Size, and Gender: Results of ANOVA

Index	F-ratio	*p*
English		
Race	806.86	.000*
Class Size	1104.20	.000*
Gender	1.37	.241
Race*Class Size	7.79	.000*
Gender*Class Size	1.29	.275
Race*Class Size*Gender	1.41	.177
Math		
Race	833.41	.000*
Class Size	1173.13	.000*
Gender	335.09	.000*
Race*Class Size	35.34	.000*
Gender*Class Size	25.23	.000*
Race*Class Size*Gender	13.34	.000*
Reading		
Race	792.58	.000*
Class Size	748.60	.000*
Gender	2.46	.117
Race*Class Size	8.62	.000*
Gender*Class Size	2.86	.057
Race*Class Size*Gender	1.30	.229
Science		
Race	760.00	.000*
Class Size	791.26	.000*
Gender	293.83	.000*
Race*Class Size	12.55	.000*
Gender*Class Size	24.23	.000*
Race*Class Size*Gender	4.18	.000*

Note. * $p < .05$

There was a statistically significant difference at the .05 level among race in the English ACT sub-score, F (2,6) = 890.00, $p < .001$. There was a statistically significant difference at the .05 level among the class sizes in the English ACT sub-score, F (3,6) =

1104.20, $p < .001$. There was no statistically significant difference at the .05 level between genders in the English ACT sub-score, F (1,6) = 1.37, $p = .241$. There was a statistically significant interaction between race and class size in the English ACT sub-score, F (2,3) = 7.79, $p < .001$. There was no statistically significant interaction between gender and class size in the English ACT sub-score, F (1,3) = 1.29, $p = .275$. There was no statistically significant interaction among race, class size, and gender in the English ACT sub-score, F (6,9) = 1.41, $p = .177$.

There was a statistically significant difference at the .05 level among race in the Math ACT sub-score, F (2,6) = 833.41, $p < .001$. There was a statistically significant difference at the .05 level among the class sizes in the Math ACT sub-score, F (3,6) = 1173.13, $p < .001$. There was a statistically significant difference at the .05 level between genders in the Math ACT sub-score, F (1,6) = 335.09, $p < .001$. There was a statistically significant interaction between race and class size in the Math ACT sub-score, F (2,3) = 35.34, $p < .001$. There was a statistically significant interaction between gender and class size in the Math ACT sub-score, F (1,3) = 25.23, $p < .001$. There was a statistically significant interaction among race, class size, and gender in the Math ACT sub-score, F (6,9) = 13.34, $p < .001$. Since there was a statistically significant interaction, a simple effects test was conducted.

Table 44

Simple Effects of Math ACT Score by Race and Class Size Based on Male

Gender	Race	Class Size	Mean difference	*p*
Male	African American	399 and below vs 400-599	.63	.000*
		399 and below vs 600 -899	1.97	.000*
		399 and below vs 900 or more	4.59	.000*
		400-599 vs 600 -899	1.54	.000*
		400-599 vs 900 or more	3.96	.000*
		600-899 vs 900 or more	2.62	.000*
	White	399 and below vs 400-599	2.12	.000*
		399 and below vs 600 -899	4.28	.000*
		399 and below vs 900 or more	8.19	.000*
		400-599 vs 600 -899	2.16	.000*
		400-599 vs 900 or more	6.07	.000*
		600-899 vs 900 or more	3.91	.000*
	Other	399 and below vs 400-599	.72	.000*
		399 and below vs 600 -899	3.31	.000*
		399 and below vs 900 or more	7.29	.000*
		400-599 vs 600 -899	3.59	.000*
		400-599 vs 900 or more	6.57	.000*
		600-899 vs 900 or more	3.98	.000*

Note. * p < .05

The simple effects test on Table 44 of male Math ACT sub-scores by race and class size at a .05 level resulted in African Americans with a class size of 400-599 (*M* = 15.23, *SD* = 3.76, *n* = 1625) having a statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.04, *SD* = 1.84, *n* = 1187); African American with a class size of 600-899 (*M* = 17.01, *SD* = 2.98, *n* = 637) scored statistically significantly higher Math ACT mean score than did those

who graduated from the class size of 399 and below (*M* = 15.04, *SD* = 1.84, *n* = 1187) and the class size of 400-599 (*M* = 15.67, *SD* = 2.21, *n* = 678); African Americans with a class size of 900 or more (*M* = 19.63, *SD* = 3.85, *n* = 199) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.04, *SD* = 1.84, *n* = 1187), 400-599 (*M* = 15.67, *SD* = 2.21, *n* = 678), and 600-899 (*M* = 17.01, *SD* = 2.98, *n* = 637); White with a class size of 400-599 (*M* = 16.78, *SD* = 3.23 *n* = 79) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.07, *SD* = 2.50, *n* = 122);White with a class size of 600-899 (*M* = 19.37, *SD* = 3.89, *n* = 149) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.07, *SD* = 2.50, *n* = 122) and the class size of 400-599 (*M* = 16.78, *SD* = 3.23 *n* = 79);White with a class size of 900 or more (*M* = 23.35, *SD* = 4.47, *n* = 119) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.07, *SD* = 2.50, *n* = 122), 400-599 (*M* = 16.78, *SD* = 3.23 *n* = 79), and 600-899 (*M* = 19.37, *SD* = 3.89, *n* = 149); Other with a class size of 400-599 (*M* = 17.68, *SD* = 3.07, *n* = 697) having a statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.56, *SD* = 2.71, *n* = 915);Other with a class size of 600-899 (*M* = 19.84, *SD* = 3.79, *n* = 1243) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.56, *SD* = 2.71, *n* = 915) and the class size of 400-599 (*M* = 17.68, *SD* = 3.07, *n* = 697);Other with a class size of 900 or more (*M* = 23.75, *SD* = 4.71,

n = 1000) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.56, *SD* = 2.71, *n* = 915), 400-599 (*M* = 17.68, *SD* = 3.07, *n* = 697), and 600-899 (*M* = 19.84, *SD* = 3.79, *n* = 1243).

Table 45

Simple Effects of Math ACT Score by Race and Class Size based on Female

Gender	Race	Class Size	Mean difference	*p*
Female	African American	399 and below vs 400-599	.65	.000*
		399 and below vs 600 -899	1.53	.000*
		399 and below vs 900 or more	3.74	.000*
		400-599 vs 600 -899	.88	.000*
		400-599 vs 900 or more	3.09	.000*
		600-899 vs 900 or more	2.21	.000*
	White	399 and below vs 400-599	.58	.126
		399 and below vs 600 -899	2.12	.000*
		399 and below vs 900 or more	3.64	.000*
		400-599 vs 600 -899	1.25	.001*
		400-599 vs 900 or more	4.77	.000*
		600-899 vs 900 or more	4.52	.000*
	Other	399 and below vs 400-599	.59	.000*
		399 and below vs 600 -899	1.66	.000*
		399 and below vs 900 or more	5.61	.000*
		400-599 vs 600 -899	1.15	.000*
		400-599 vs 900 or more	5.02	.000*
		600-899 vs 900 or more	4.87	.000*

Note. * p < .05

The simple effects test on Table 45 of female Math ACT sub-scores by race and class size at a .05 level resulted in African Americans with a class size of 400-599 (*M* = 15.10, *SD* = 1.84, *n* = 945) having a statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.45, *SD*

= 1.70, *n* = 1135); African American with a class size of 600-899 (*M* = 15.98, *SD* = 2.34, *n* = 1240) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 14.45, *SD* = 1.70, *n* = 1135) and the class size of 400-599 (*M* = 15.10, *SD* = 1.84, *n* = 945); African Americans with a class size of 900 or more (*M* = 18.18, *SD* = 3.09, *n* = 689) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 14.45, *SD* = 1.70, *n* = 1135), 400-599 (*M* = 15.10, *SD* = 1.84, *n* = 945), and 600-899 (*M* = 15.98, *SD* = 2.34, *n* = 1240); White with a class size of 400-599 (*M* = 16.11, *SD* = 2.39 *n* = 121) scored statistically significantly lower Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.52, *SD* = 2.13, *n* = 130);White with a class size of 600-899 (*M* = 17.26, *SD* = 3.14, *n* = 204) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.52, *SD* = 2.13, *n* = 130) and the class size of 400-599 (*M* = 16.11, *SD* = 2.39 *n* = 121);White with a class size of 900 or more (*M* = 21.13, *SD* = 4.30, *n* = 213) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.52, *SD* = 2.13, *n* = 130), 400-599 (*M* = 16.11, *SD* = 2.39 *n* = 121), and 600-899 (*M* = 17.26, *SD* = 3.14, *n* = 204); Other with a class size of 400-599 (*M* = 16.48, *SD* = 2.33, *n* = 813) having a statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.61, *SD* = 1.97, *n* = 742);Other with a class size of 600-899 (*M* = 17.73, *SD* = 2.81, *n* = 1628) scored statistically significantly higher Math ACT mean score than did those who graduated from the class

size of 399 and below (M = 15.61, SD = 1.97, n = 742) and the class size of 400-599 (M = 16.48, SD = 2.33, n = 813);Other with a class size of 900 or more (M = 21.26, SD = 4.03, n = 1866) scored statistically significantly higher Math ACT mean score than did those who graduated from the class size of 399 or below (M = 15.61, SD = 1.97, n = 742), 400-599 (M = 16.48, SD = 2.33, n = 813), and 600-899 (M = 17.73, SD = 2.81, n = 1628).

There was a statistically significant difference at the .05 level among race in the Reading ACT sub-score, F (2,6) = 792.58, $p < .001$. There was a statistically significant difference at the .05 level among the class sizes in the Reading ACT sub-score, F (3,6) = 748.60, $p < .001$. There was no statistically significant difference at the .05 level between genders in the Reading ACT sub-score, F (1,6) = 2.46, $p = .117$. There was a statistically significant interaction between race and class size in the Reading ACT sub-score, F (2,3) = 8.62, $p < .001$. There was no statistically significant interaction between gender and class size in the Reading ACT sub-score, F (1,3) = 2.86, $p = .057$. There was no statistically significant interaction among race, class size, and gender in the Reading ACT sub-score, F (6,9) = 1.30, $p = .229$.

There was a statistically significant difference at the .05 level among race in the Science reasoning ACT sub-score, F (2,6) = 760.00, $p < .001$. There was a statistically significant difference at the .05 level among the class sizes in the Science reasoning ACT sub-score, F (3,6) = 791.26, $p < .001$. There was a statistically significant difference at the .05 level between genders in the Science reasoning ACT sub-score, F (1,6) = 293.83, $p < .001$. There was a statistically significant interaction between race and class size in the Science reasoning ACT sub-score, F (2,3) = 12.55, $p < .001$. There was a statistically

significant interaction between gender and class size in the Science reasoning ACT sub-score, F (1,3) = 24.23, $p < .001$. There was a statistically significant interaction among race, class size, and gender in the Science reasoning ACT sub-score, F (6,9) = 4.18, $p < .001$. Since there was a statistically significant interaction, a simple effects test was conducted.

Table 46

Simple Effects of Science ACT Score by Race and Class Size based on Male

Gender	Race	Class Size	Mean difference	*p*
Male	African American	399 and below vs 400-599	.89	.000*
		399 and below vs 600 -899	2.37	.000*
		399 and below vs 900 or more	4.71	.000*
		400-599 vs 600 -899	1.48	.000*
		400-599 vs 900 or more	3.82	.000*
		600-899 vs 900 or more	2.74	.000*
	White	399 and below vs 400-599	1.31	.000*
		399 and below vs 600 -899	2.96	.000*
		399 and below vs 900 or more	6.19	.000*
		400-599 vs 600 -899	1.65	.000*
		400-599 vs 900 or more	2.74	.000*
		600-899 vs 900 or more	2.34	.000*
	Other	399 and below vs 400-599	.58	.237
		399 and below vs 600 -899	3.35	.000*
		399 and below vs 900 or more	5.99	.000*
		400-599 vs 600 -899	2.77	.000*
		400-599 vs 900 or more	5.41	.000*
		600-899 vs 900 or more	2.64	.000*

Note. * p < .05

The simple effects test on Table 46 of male Science reasoning ACT sub-scores by race and class size at a .05 level resulted in African Americans with a class size of 400-

599 (*M* = 16.57, *SD* = 2.92, *n* = 678) having a statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.68, *SD* = 2.86, *n* = 1187); African American with a class size of 600-899 (*M* = 18.05, *SD* = 3.10, *n* = 637) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.68, *SD* = 2.86, *n* = 1187) and the class size of 400-599 (*M* = 16.57, *SD* = 2.92, *n* = 678); African Americans with a class size of 900 or more (*M* = 20.39, *SD* = 3.32, *n* = 199) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.68, *SD* = 2.86, *n* = 1187), 400-599 (*M* = 16.57, *SD* = 2.92, *n* = 678), and 600-899 (*M* = 18.05, *SD* = 3.10, *n* = 637); White with a class size of 400-599 (*M* = 18.06, *SD* = 3.52, *n* = 79) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.48, *SD* = 3.09, *n* = 122);White with a class size of 600-899 (*M* = 20.83, *SD* = 3.31, *n* = 149) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.48, *SD* = 3.09, *n* = 122) and the class size of 400-599 (*M* = 18.06, *SD* = 3.52, *n* = 79);White with a class size of 900 or more (*M* = 23.47, *SD* = 4.06, *n* = 119) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 17.48, *SD* = 3.09, *n* = 122), 400-599 (*M* = 18.06, *SD* = 3.52, *n* = 79), and 600-899 (*M* = 20.83, *SD* = 3.31, *n* = 149); Other with a class size of 400-599 (*M* = 19.18, *SD* = 3.17, *n* = 697) having a statistically significantly lower Science reasoning ACT mean score than

did those who graduated from the class size of 399 and below (*M* = 17.87, *SD* = 3.02, *n* = 915);Other with a class size of 600-899 (*M* = 20.83, *SD* = 3.15, *n* = 1243) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 17.87, *SD* = 3.02, *n* = 915) and the class size of 400-599 (*M* = 19.18, *SD* = 3.17, *n* = 697);Other with a class size of 900 or more (*M* = 24.06, *SD* = 3.69, *n* = 1000) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 17.87, *SD* = 3.02, *n* = 915), 400-599 (*M* = 19.18, *SD* = 3.17, *n* = 697), and 600-899 (*M* = 20.83, *SD* = 3.15, *n* = 1243).

Table 47

Simple Effects of Science ACT Score by Race and Class Size based on Female

Gender	Race	Class Size	Mean difference	*p*
Female	African American	399 and below vs 400-599	.89	.000*
		399 and below vs 600 -899	1.85	.000*
		399 and below vs 900 or more	3.91	.000*
		400-599 vs 600 -899	.96	.000*
		400-599 vs 900 or more	3.02	.000*
		600-899 vs 900 or more	2.06	.000*
	White	399 and below vs 400-599	1.24	.000*
		399 and below vs 600 -899	2.34	.000*
		399 and below vs 900 or more	5.32	.000*
		400-599 vs 600 -899	1.10	.000*
		400-599 vs 900 or more	4.08	.000*
		600-899 vs 900 or more	2.98	.000*
	Other	399 and below vs 400-599	.45	.321
		399 and below vs 600 -899	2.48	.000*
		399 and below vs 900 or more	5.46	.000*
		400-599 vs 600 -899	2.05	.000*
		400-599 vs 900 or more	5.03	.000*
		600-899 vs 900 or more	2.98	.000*

Note. * p < .05

The simple effects test on Table 47 of female Science reasoning ACT sub-scores by race and class size at a .05 level resulted in African Americans with a class size of 400-599 (*M* = 16.08, *SD* = 2.92, *n* = 945) having a statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.19, *SD* = 2.86, *n* = 1135); African American with a class size of 600-899 (*M* = 17.04, *SD* = 3.10, *n* = 1240) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 15.19, *SD* = 2.86, *n* = 1135) and the class size of 400-599 (*M* = 16.08, *SD* = 2.92, *n* = 945); African Americans with a class size of 900 or more (*M* = 19.10, *SD* = 3.32, *n* = 689) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 15.19, *SD* = 2.86, *n* = 1135), 400-599 (*M* = 16.08, *SD* = 2.92, *n* = 945), and 600-899 (*M* = 17.04, *SD* = 3.10, *n* = 1240); White with a class size of 400-599 (*M* = 16.59, *SD* = 3.52, *n* = 121) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.16, *SD* = 3.09, *n* = 130);White with a class size of 600-899 (*M* = 18.64, *SD* = 3.31, *n* = 204) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.16, *SD* = 3.09, *n* = 130) and the class size of 400-599 (*M* = 16.59, *SD* = 3.52, *n* = 121);White with a class size of 900 or more (*M* = 21.62, *SD* = 4.06, *n* = 213) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.16, *SD* = 3.09, *n* = 130), 400-599 (*M* = 16.59, *SD* = 3.52, *n* = 121), and

600-899 (*M* = 18.64, *SD* = 3.31, *n* = 204); Other with a class size of 400-599 (*M* = 17.85, *SD* = 3.17, *n* = 813) having a statistically significantly lower Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.61, *SD* = 3.02, *n* = 742);Other with a class size of 600-899 (*M* = 18.95, *SD* = 3.15, *n* = 1628) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 and below (*M* = 16.61, *SD* = 3.02, *n* = 742) and the class size of 400-599 (*M* = 17.85, *SD* = 3.17, *n* = 813);Other with a class size of 900 or more (*M* = 21.93, *SD* = 3.69, *n* = 1866) scored statistically significantly higher Science reasoning ACT mean score than did those who graduated from the class size of 399 or below (*M* = 16.61, *SD* = 3.02, *n* = 742), 400-599 (*M* = 17.85, *SD* = 3.17, *n* = 813), and 600-899 (*M* = 18.95, *SD* = 3.15, *n* = 1628).

Research Question 4

Research question 4 asks which demographic variables in the 2006 ACT Student Profile Section, (a) race and ethnicity, (b) class size, (c) gender, and (d) high school curriculum, are the best predictors of the mean 2006 ACT sub-scale scores in English, mathematics, and Science reasoning of the high school graduates in Mississippi? The SPSS statistical program was used to run the multiple linear regressions.

Table 48

Summary of Linear Regression Model Analysis for Variables Predicting English ACT sub-score

Variable	Beta	*t*	*p*
Intercept	2.75	3.42	.000*
Race	1.57	40.63	.000*
Size	2.64	79.52	.000*
Gender	0.07	1.93	.054
English 9	-2.33	-2.76	.006*
English 10	.12	0.23	.817
English 11	-.34	-2.06	.040*
English 12	.24	2.99	.003*

*$p < .05$
R-square: .4016
Adjusted R-square: .4014

Note. * p < .05

This linear regression analysis was performed to determine which demographic (predictor) variables accounted for a statistically significant amount of the variation in the criterion variable, English ACT score. The result of the analysis indicated that 40.16% of the total variation in the English ACT sub-score was explained by the seven predictors. The ANOVA results at the .05 level were statistically significant, F (7,15891) = 1523.80, $p < .001$. The demographic variables were (a) race, (b) class size, (c) gender, (d) English 9, (e) English 10, (f) English 11, and (g) English 12.

The regression equation also calculated individual independent *t*-tests using separate unstandardized coefficients as the independent variables and the English ACT sub-score as the dependent variable. The *t*-tests were performed to determine whether any of the separate obtained unstandardized coefficients differ from zero. A coefficient of zero indicates the lack of relationship to the dependent variable. The *t*-test for the English

ACT sub-score indicated that the predictor variable, race, was statistically significant at the .05 level, t (1,7) = 40.63, $p < .001$. The *t*-test for the English ACT sub-score indicated that the predictor variable, class size, was statistically significant at the .05 level, t (1,7) = 79.52, $p < .001$. The *t*-test for the English ACT sub-score indicated that the predictor variable, gender, was not statistically significant at the .05 level, t (1,7) = 1.93, $p = .05$. The *t*-test for the English ACT sub-score indicated that the predictor variable, English 9, was statistically significant at the .05 level, t (1,7) = -2.76, $p = .005$. The *t*-test for the English ACT sub-score indicated that the predictor variable, English 10, was not statistically significant at the .05 level, t (1,7) = 0.23, $p = .817$. The *t*-test for the English ACT sub-score indicated that the predictor variable, English 11, was statistically significant at the .05 level, t (1,7) = -2.06, $p = .04$. The *t*-test for the English ACT sub-score indicated that the predictor variable, English 12, was statistically significant at the .05 level, t (1,7) = 2.99, $p = .003$. The summary of this analysis is in Table 48.

Table 49

Summary of Linear Regression Model Analysis for
Variables Predicting Math ACT sub-score

Variable	Beta	*t*	*p*
Intercept	20.49	65.03	.000*
Race	1.08	41.67	.000*
Size	1.03	39.00	.000*
Gender	-.60	-24.31	.000*
Algebra 1	-.36	-1.92	.055
Algebra 2	-.44	-11.33	.000*
Geometry	-.19	-1.74	.081
Trigonometry	-.79	-20.92	.000*
Beginning Calculus	-1.32	-29.38	.000*
Advanced Math	-.46	-13.08	.000*

*$p < .05$
R-square: .5163
Adjusted R-square: .5160

Note. * p < .05

This linear regression analysis was performed to determine which demographic (predictor) variables accounted for a statistically significant amount of the variation in the criterion variable, Math ACT score. The result of the analysis indicated that 51.63% of the total variation in the Math ACT sub-score was explained by the nine predictors. The ANOVA results at the .05 level were statistically significant, F (9,14224) = 1686.91, $p <$ .001. The demographic variables were (a) race, (b) class size, (c) gender, (d) Algebra I, (e) Algebra II, (f) Geometry, (g) Trigonometry, (h) Beginners Calculus, and (i) Advanced Math.

The regression equation also calculated individual independent *t*-tests using separate unstandardized coefficients as the independent variables and the Math ACT sub-

score as the dependent variable. The *t*-tests were performed to determine whether any of the separate obtained unstandardized coefficients differ from zero. A coefficient of zero indicates the lack of relationship to the dependent variable. The *t*-test for the Math ACT sub-score indicated that the predictor variable, race, was statistically significant at the .05 level, t (1,9) = 41.67, $p < .001$. The *t*-test for the Math ACT sub-score indicated that the predictor variable, class size, was statistically significant at the .05 level, t (1,9) = 39.00, $p < .001$. The *t*-test for the Math ACT sub-score indicated that the predictor variable, gender, was statistically significant at the .05 level, t (1,9) = -24.31, $p < .001$. The *t*-test for the Math ACT sub-score indicated that the predictor variable, Algebra I, was not statistically significant at the .05 level, t (1,9) = -1.92, $p = .055$. The *t*-test for the Math ACT sub-score indicated that the predictor variable, Algebra II, was statistically significant at the .05 level, t (1,9) = -11.33, $p < .001$. The *t*-test for the Math ACT sub-score indicated that the predictor variable, Geometry, was not statistically significant at the .05 level, t (1,9) = -1.74, $p = .081$. The *t*-test for the Math ACT sub-score indicated that the predictor variable, Trigonometry, was statistically significant at the .05 level, t (1,9) = -20.92, $p < .001$. The *t*-test for the Math ACT sub-score indicated that the predictor variable, Beginners Calculus, was statistically significant at the .05 level, t (1,9) = -29.38, $p < .001$. The *t*-test for the Math ACT sub-score indicated that the predictor variable, Advanced Math, was statistically significant at the .05 level, t (1,9) = -13.08, $p < .001$. The summary of this analysis is in Table 49.

Table 50

Summary of Linear Regression Model Analysis for Variables Predicting Science ACT sub-score

Variable	Beta	*t*	*p*
Intercept	14.96	42.00	.000*
Race	1.20	38.75	.000*
Size	1.39	47.02	.000*
Gender	-.62	-20.92	.000*
Gen. Science	.07	2.05	.040*
Biology	-.62	-2.54	.011*
Chemistry	-.49	-13.81	.000*
Physics	-.76	-18.99	.000*

*$p < .05$
R-square: .3630
Adjusted R-square: .3627

Note. * p < .05

This linear regression analysis was performed to determine which demographic (predictor) variables accounted for a statistically significant amount of the variation in the criterion variable, Science reasoning ACT score. The result of the analysis indicated that 51.63% of the total variation in the Science reasoning ACT sub-score was explained by the seven predictors. The ANOVA results at the .05 level were statistically significant, $F(7,14273) = 1162.13$, $p < .001$. The demographic variables were (a) race, (b) class size, (c) gender, (d) General Science, (e) Biology, (f) Chemistry, and (g) Physics.

The regression equation also calculated individual independent *t*-tests using separate unstandardized coefficients as the independent variables and the Science reasoning ACT sub-score as the dependent variable. The *t*-tests were performed to determine whether any of the separate obtained unstandardized coefficients differ from zero. A coefficient of zero indicates the lack of relationship to the dependent variable.

The *t*-test for the Science reasoning ACT sub-score indicated that the predictor variable, race, was statistically significant at the .05 level, t (1,7) = 38.75, $p < .001$. The *t*-test for the Science reasoning ACT sub-score indicated that the predictor variable, class size, was statistically significant at the .05 level, t (1,7) = 47.02, $p < .001$. The *t*-test for the Science reasoning ACT sub-score indicated that the predictor variable, gender, was statistically significant at the .05 level, t (1,7) = -20.92, $p < .001$. The *t*-test for the Science reasoning ACT sub-score indicated that the predictor variable, General Science, was statistically significant at the .05 level, t (1,7) = 2.05, $p = .04$. The *t*-test for the Science reasoning ACT sub-score indicated that the predictor variable, Biology, was statistically significant at the .05 level, t (1,7) = -2.54, $p = .011$. The *t*-test for the Science reasoning ACT sub-score indicated that the predictor variable, Chemistry, was statistically significant at the .05 level, t (1,7) = -13.81, $p < .001$. The *t*-test for the Science reasoning ACT sub-score indicated that the predictor variable, Physics, was statistically significant at the .05 level, t (1,7) = -18.99, $p < .001$. The summary of this analysis is in Table 50.

Summary

The four questions tested in this research study attempted to identify the variables that could predict success on the American College Test (ACT). The ACT composite score of the sub-scores combined is used as an entrance requirement into the state supported institutions in Mississippi. The research in this section was focused on the racial or ethnic background, gender, size of graduating class size, and program of study for the students that completed the 2006 ACT in Mississippi.

Based on the research findings and that the significance of all statistical test were at the .05 alpha level, all four questions were found to be statistically significant except for gender in English and reading.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purposes of this chapter are to summarize the study and to present conclusions and recommendations. The purpose for this study was to examine the effect of selected student profile variables in the 2005 American College Test (ACT) on academic performance of Mississippi high school graduates as measured by the sub-scales in the ACT. Dependent variables included the sub-scores of English, mathematics, reading, and science reasoning on the ACT. The problem of this study was to determine if there was a difference between Mississippi high school students' ACT scores as measured by the ACT assessment sub-scale scores using variables in the Student Profile Section as the independent variables: (a) race or ethnicity, (b) gender, (c) class size, and (d) high school curriculum.

Data were collected from the files of 16,779 Mississippi high school graduates that completed the ACT in 2005. The files were analyzed using the SPSS statistical program at Mississippi State University. Statistics used in analyzing the data were ANOVA and multiple linear regressions.

Summary

The research design used in this study was causal comparative or *ex post facto*. According to Borg and Gall (1989), the causal comparative model is designed for the

discovery of possible causes and effect of a behavior pattern or personal characteristic; this procedure compared certain subjects where behaviors exist to similar subjects in whom these behaviors are absent or present but to a less significant degree. Findings of the study were as follows:

1. The first question asked if there was a statistically significant difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (African American/Black, Caucasion-American/White, and other students), who graduated from schools with graduating class of 900 or more, 600-899, 400-599, and 399 or below in Mississippi? The dependent variables were the ACT mathematics, English, reading and science reasoning sub-scale scores. Based on the analysis of the total group using ANOVA, all subtests were investigated. A significant difference was found in all four class sizes at the .05 level. Significant differences in the ACT program variables (i.e. English, mathematics, reading, and science reasoning) were found among the four graduating class sizes in favor of the 900 or more class size.
2. The second question asked if there was a statistically significant difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students) and class size (900 or more, 600-899, 400-599, and 399 or below), who completed high school curriculum program courses in business or commercial, vocational-

occupational, college preparatory, and other general programs in Mississippi? The dependent variables were mathematics, English, reading, and science reasoning sub-scales. Based on the analysis of the total group using ANOVA, all subtests were investigated. A significant difference was found in all four programs of study at the .05 level. Significant differences in the ACT program variables (i.e. English, mathematics, reading, and science reasoning) were found among the four programs of study in favor of the college preparatory program of study.

3. Is there a statistically significant difference in mean 2005 ACT sub-scale scores between males and females, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students) and class size (900 or more, 600-899, 400-599, and 399 or below), in Mississippi? The dependent variables were mathematics, English, reading, and science reasoning sub-scales. Based on the analysis of the total group using ANOVA, all subtests were investigated. A significant difference was found between the genders at the .05 level in mathematics and science reasoning. Significant differences in the ACT program variables (i.e. English, mathematics, reading, and science reasoning) were found between the two genders in favor of males.

4. Which demographic variables in the 2005 ACT Student Profile Section, (a) gender, (b) race and ethnicity, (c)class size, and (d) high school

curriculum are the best predictors of mean 2005 ACT sub-scale scores of the high school graduates? The dependent variables were mathematics, English, and science reasoning sub-scales. The three independent variables were analyzed using the linear regression model to determine the best predictor set. Only two variables explained 40% of the variance of the English ACT sub-score: race and ethnicity, and class size. Three variables explained 52% of the variance of the math ACT sub-score: (a) race and ethnicity, (b) class size, and (c) gender. All four variables explained 36 % of the variance of the science reasoning ACT sub-score.

Conclusions

The following conclusions were drawn based upon the findings in this study:

The first question asked if there was a statistically significant difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (African American/Black, Caucasian-American/White, and other students), who graduated from schools with graduating class of 900 or more, 600-899, 400-599, and 399 or below in Mississippi with dependent variables: mathematics, English, reading and science reasoning sub-scale scores. This study indicated that the larger the class size, the larger the ACT mean sub-score for the graduates of that size school. The scores increased consistently across all four sub-scores of English, mathematics, reading, and science reasoning. The increase of ACT mean sub-scores in English, mathematics, reading, and

science reasoning is also evident in the increase of the class size in each race/ethnicity (African American/Black, Caucasian-American/White, and other students).

It is concluded that if students have a choice of which school to attend that the larger schools offer the best advantages for producing higher ACT sub-scores and composite mean scores. In regards to each race/ethnicity, the ACT mean sub-scores for the students categorized as “other” scored the highest on each ACT mean sub-score, the students categorized as “Caucasian” following, and the students categorized as “African American” scoring the lowest. It is also concluded that each race/ethnicity does not have an equal opportunity on the ACT. This conclusion is supported by Chambers (1988) who found students attending smaller high schools did score lower on the ACT which affirms the findings of this study. In every sub-score and ethnicity, the class size of 900 or more had the largest ACT mean sub-score. It may be concluded that the consolidation of small schools in some districts could result in higher ACT achievement for students.

The second question that asked if there was a statistically significant difference in the mean 2005 ACT sub-scale scores for students, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students) and class size (900 or more, 600-899, 400-599, and 399 or below), who completed high school curriculum program courses in business or commercial, vocational-occupational, college preparatory, and other general programs in Mississippi with the dependent variables: mathematics, English, reading, and science reasoning sub-scales. The ACT sub-scale scores were found to be higher for the graduates that completed the college preparatory program of study compared to students in the other or general preparatory curriculum.

It is concluded that the graduates who completed the other or general preparatory curriculum ranked second with graduates that completed the business and vocational program of study scoring the lowest of all three. The lowest mean sub-scale score of a program of study was in the English ACT sub-score based on the business and vocational program of study. The highest mean score of a program of study was in the Reading ACT sub-score based on the college preparatory program of study. This result may be attributed to certain classes, e.g., non-college prep classes, taken in the program of study instead of taking the general classes needed to learn the core curriculum information.

The third question asked if there was a statistically significant difference in mean 2005 ACT sub-scale scores between males and females, controlled for ethnicity (Afro-American/Black, Caucasian-American/White, and other students) and class size (900 or more, 600-899, 400-599, and 399 or below), in Mississippi with the dependent variables: mathematics, English, reading, and science reasoning sub-scales. The evaluation of the effect of gender difference on the mean ACT sub-scores established that males score higher than females overall by 2.71.

It is concluded that individually, males scored higher in mathematics, reading, and science reasoning. Females only scored the highest in English. Mau and Lynn (2001) state that males perform better on cognitive tests while the females perform better on the coursework.

Question four asked which demographic variables in the 2005 ACT Student Profile Section, (a) gender, (b) race and ethnicity, (c) class size, and (d) high school curriculum are the best predictors of mean 2005 ACT sub-scale scores of the high school

graduates with dependent variables: mathematics, English, and science reasoning sub-scales. The study indicated that the highest percentage of variance resulted in the Math ACT sub-score with 52% of variance being explained by the variables: (a) race and ethnicity, (b) class size, (c) gender, and (d) completion of the courses of Algebra II, Trigonometry, Beginner Calculus, and Advanced Math.

It is concluded that the four variables of race and ethnicity, class size, gender, and program of study resulted in a smaller percentage of variance in the English ACT sub-score (40%) and an even smaller percentage of variance in science reasoning (36%). Due to the low percentages of variance, all the necessary variables that influence the ACT mean sub-scores were not tested.

In conclusion, this study indicated that there were statistically significant differences in the ACT sub-score means among the different racial and ethnic groups of students. The mean scores were the lowest for the race and ethnicity variable in the African American background. The lowest ACT sub-score mean was in the 399 or below class size, and the highest ACT sub-score mean was in the 900 or more class size. The college preparatory program of study scored higher mean scores than the lower ranking other or general and business/vocational program of study, respectively. Overall, males scored higher on the ACT sub-scores than the females with females outranking males in English. These were found to be probable predictors of success on the ACT.

Recommendations

The following recommendations are made from the findings in this study:

1. The findings of this study indicated that students who attend schools of larger class sizes, preferably 900 or more students score higher on the sub-scales of ACT. Further research should be conducted relative to courses offered in larger schools which have increased ACT mean scores of English, mathematics, reading, and science reasoning compared to schools of smaller class sizes.
2. The findings of this study indicated that students categorized as “Other” score higher than “Caucasians” and “African Americans” with “African Americans” scoring the lowest in all four sub-scales of English, mathematics, reading, and science reasoning. Additional research should be conducted on the different opportunities available to the various racial and ethnic backgrounds that account for the varying ACT mean sub-scores.
3. The findings of this study indicated that students that complete the college preparatory program of study scored significantly higher than the business/vocational and other, or general, programs of study. Future studies should be conducted on the different programs of study in high school to detect the quality of the classes offered by the college preparatory program of study which accounted for the highest ACT mean sub-scores.

4. The findings of this study indicated that males score higher on the ACT sub-scores of mathematics, reading, and science reasoning and females score higher on the ACT English sub-score. Additional research should be conducted on the different learning styles and intelligences of each gender in addition to other factors that may affect their differing ACT mean sub-scores.

REFERENCES

ACT, Inc. (2003). 2002 ACT Composite Averages by State, retrieved March 19, 2006, from www.act.org/news/data/02/states.html

ACT, Inc. (2003). *Content validity evidence in support of ACT's educational achievement tests: ACT National Curriculum Survey 2002*-2003. Iowa City, Iowa.

American College Testing Program. (1997). *Technical Manual*. Iowa City, Iowa.

Amos, N.G., & Moody, L. (1981). *The relationship of school district size and cost factors to achievement of fourth and eighth grade students.* Mississippi State University: Bureau of Educational Research.

Amrein, A., and Berliner, D. (2003). The effects of high-stakes testing on student motivation and learning. *Educational Leadership, 60* (5), 32-37.

Ang, C., & Noble, J. (1993) *Incremental validity of ACT assessment scores and high school course information for freshman course placement.* (ACT Research Report No. *93-5)* Iowa City, Iowa: The American College Testing Program.

Ashby, N. (Ed.). (2005, February 1). International studies show mixed results among U.S. students. *The Achiever, 4* (2), 1.

Barton, P. (2005, February). *One-third of a nation: Rising dropout rates and declining opportunities*. Available through Policy Information Center Educational Testing Service. Retrieved April 2, 2005, from http://www.ets.org/research/pic

Beaver, W. (1996). Is it time to replace the SAT? *Academe, 82*, 3.

Biggers, N. (1995). *The Ayers decision, memorandum opinion and remedial decree* (Rep. No. 4: 75CV009-B-O). Jackson, MS: Board of Trustees of State Institutions of Higher Learning.

Black, S. (2005, January). Acing the exam. *American School Board Journal*, 35-37, 46.

Blair, J. (1999). NAACP criticizes colleges' use of SAT, ACT. *Education Week, 19* (14), 10.

Bontekoe, J. (1992). *The ACT as a predictor of college success at Trinity Christian College.*

Brown, C. (2005, May 4). Governor's comments on education misleading. *The Starkville Daily News*, p. A4.

Byrd, S. (2005, May 10). Dropout rate to be targeted by lawmakers. *The Clarion-Ledger*, p. 9A.

Caston, B. (1989). *A study of the relationship of six variables to the results of the eleventh grade basic skills assessment program in Mississippi school districts* (Doctoral dissertation, Delta State University, 1988). Dissertation Abstracts International, 49, 1357A.

Cavanagh, S. (2005). ACT admissions test, like rival, adds essay, but makes it optional. *Education Week*, *24* (21), 14.

Chambers, G. (1988, March). *All of America's children: Variants in ACT test scores—What principals need to know.* Paper presented at the Annual Conference of the National Association of Secondary School Principals. Anaheim, CA. (ERIC Document Reproduction Service No. ED292934)

Colgan, C. (2003, November). ACT and SAT reports send mixed messages. *American School Board Journal*, 8-10.

College graduation requirements. (nd). Retrieved February 3, 2005, from http://www.ihl.edu

Collison, M. (1999). SAT and ACT face exam negation. *Black Issues in Higher Education*, *16* (8), 15.

Crisp, E. (2005, May 20). College board ups requirements. *The Clarion-Ledger*. Retrieved May 20, 2005, from http://www.clarionledger.com

Davidsen, O.M. (1963). *Survey of reliability of student self-reported high school grades.* Iowa City, Iowa: The American College Testing Program.

Edington, E.D. (1981, October). *ACT scores of incoming freshman to New Mexico State University by high school size.* Las Cruces: New Mexico State University. (ERIC Document Reproduction Service No. ED272354)

Ezarik, M. (2003, October). *College hopefuls: Ready or not?* Retrieved March 15, 2005, from http://www.DistrictAdministration.com

Farmer, H.S. (1983). Career and homemaking plans for high school youth. *Journal of Counseling Psychology, 30,* 40-45.

Fuller, B. (2004, September 14). Associated Press, *Detroit News.*

Gandal, M., & McGiffert, L. (2003, February). The power of testing. *Educational Leadership,* 39-42.

Gay, L.R., & Airasian, P. (2003). *Educational research: Competencies for analysis and applications.* Seventh Edition. Merrill & Prentice Hall. Upper Saddle River, NJ.

Gifford, B.R. (1992). *Policy perspectives on educational testing*. Berkeley, CA: Kluwer Academic Publishers.

Greene, J., & Forster, G. (2002, April). *High school graduation rates in the United States.* Manhatten Institute, New York.

Greene, H., & Greene, M. (2004, December). *Standardized testing: Help or hindrance? What you need to know about changes to college admissions testing*. Retrieved March 1, 2005, from http://www.universitybusiness.com

Hebel, S. (1999). Minority students sue Berkley, charging bias in admissions. *The Chronicle of Higher Education,* p. 37.

Heubert, J.P., & Hauser, R.M. (1999). *High stakes testing for tracking, promotion, and graduation*: Washington, DC: National Academy Press.

High school graduation requirements. (n.d.) Retrieved February 3, 2005, from http://www.mde.k12.ms.us

Hill, T., & Lewicki, P. (2006). *STATISTICS Methods and Applications*. Statsoft, Tulsa, OK.

House, J.D. (1994). *College grade outcome and attrition: An exploratory study of non-cognitive variables and academic background as predictors* (ERIC Document Reproduction Service No. ED 390 319).

Hyde, J.S., & Linn, M.C. (1988). Gender differences in verbal ability: a meta-analysis. *Psychological Bulletin, 104,* 53-69.

Johnson, H. (2005, May 16). Funding MAEP is Mississippi's logical solution. *The Clarion-Ledger*, p. 7A.

Kanengiser, A. (2000, March 22). Is new board ready to end Ayers case? *The Clarion-Ledger*, p. B1.

Laing, J., Engen, H., & Maxey, J. (Eds.). (1986, May). *Relationship between ACT test scores and high school courses*. (Report available from Joan Laing, P.O. Box 168, Iowa City, IA 52243).

Lamb, R.R. (1976, March). *Validity of the ACT interest inventory for minority group members.* The Research and Development Division, ACT, Inc. Retrieved, June 7, 2005, from http://www.act.org/publications

Leibbrand, J. (2000). Who is teaching your children? Retrieved July 5, 2003 from www.ncate.org

Levy, L. (2001). *High school grade point average and ACT mathematics sub score as predictors of developmental mathematics student's college mathematics grade point average*. (Doctoral dissertation, University of Mississippi, 2001).

Linn, R.L. (1990). Admissions testing: recommended uses, validity, differential prediction and coaching. *Applied Measurement in Education, 3,* 297-318.

Luzzo, D.A. (1994). An analysis of gender and ethnic differences in college students' commitment to work. *Journal of Employment Counseling, 31,* 38-45.

Lyman, H.B. (1998). *Test scores and what they mean.* Needham: Allyn and Bacon.

Marklein, M.B. (2000). GPA jumps to head of class. *USA Today*, p. 10D.

Mau, W., & Lynn, R. (2001). Gender differences on the scholastic aptitude test, the American college test and college grades. *Educational Psychology, 21* (2), 133-136.

McClave, J. (2001). *Statistics for business and economics,* 8th edition. Prentice Hall, Inc. Upper Saddle River, NJ.

McClure, P. (1997). Public schools: The solution to Mississippi's woes. *Black Issues in Higher Education, 14* (6), 72.

McManus, B.L. (1991). A comparison of college admission tests, the SAT and the ACT. *Clearinghouse House, 64* (5), 339.

Morante, E.A. (1987). *A primer on placement testing*. San Francisco, CA: Jossey-Bass.

Myers, R.S., & Pyles, R. (1992). *Relationships among high school grades, ACT test scores, and college grades.*

Neville, D.S., & Super, D.E. (1988). Career maturity and commitment to work in university students. *Journal of Vocational Behavior*, 32, 139-151.

Noble, J. (2003). *The effects of using ACT composite score and high school average on college admission decisions for racial/ethnic groups*. Retrieved April 20, 2005, from http://www.act.org/research/reports/index.html

Pappas, A.W. (1990). *ACT scores of Iowa public high school students: School, student and family variables*. (Doctoral dissertation, University of Northern Iowa, 1990).

Pedhauzer E.J.(1997) *Multiple Regression in Behavioral Research: Explanation and Prediction*, 3rd ed. New York, Harcourt Brace.

Pennington, P. (2002). *The Institutions of Higher Learning Office of Academic and Student Affairs Guide*. Retrieved April 29, 2005, from http://www.IHL.edu

Raftery, I. (2004). ACT and SAT scores remain stable in 2004. *Chronicle of Higher Education*, *51* (3), 36.

Remarks as prepared for delivery by U.S. Secretary of Education Rod Paige-Act annual meeting 21st century standards: Strategies for achievement. (2001, October 17). Retrieved January 29, 2005, from http://www.ed.gov/print/news/speeches/2001/10/20011017.html

Richards, J.M., Jr., Holland, J.L., & Lutz, S.W. (1966). *The prediction of student accomplishment in college* (ACT Research Report No. 13). Iowa City, Iowa: The American College Testing Program.

Roscoe, J.T. (1975). *Fundamental Research Statistics for the Behavioral Sciences*. New York: Holt, Rinehart and Winston, Inc.

Rosser, P. (1987). *Gender bias in college admissions tests: Why women lose out*. (ERIC Document Reproduction Service No. ED 285 904)

Sandoval, J., Frisby, C.L., Geisinger, K.F., Scheuneman, J.D. & Grenier, J.R. (1998). *Test interpretation and diversity.* Washington, D.C.: American Psychological Association.

Sawyer, R., Laing, J., & Houston, M. (1988, March). *Accuracy of self-reported high school courses and grades of college-bound students.* (ACT Research Report No. 88-1). Iowa City, Iowa: The American College Testing Program.

Schenker, J., & Rumrill, P. Jr. (2004). Causal-comparative research designs. *Journal of Vocational Rehabilitation, 21,* 117-121.

Sheldon, K., & Biddle, B. (1998). Standards, accountability, and school reform: Perils and pitfalls. *Teachers College Record, 100* (1), 164-180.

Schiel, J., & Noble, J. (1991). *Accuracy of self-reported course work and grade information of high school sophomores.* Iowa City, Iowa: The American College Testing Program.

Smith, J. (1995). *A study of the relationship of Mississippi high school students' ACT assessment program test scores and probable predictor variables: Implications for performance on the ACT assessment*. (Doctoral dissertation, University of Mississippi, 1995).

Sprinthall, R. (2003). *Basic Statistical Analysis,* 7th ed. Allyn and Bacon: Boston, MA.

SPSS Inc. (2005). *SPSS 14.0 Command Syntax Reference*. Chicago: SPSS Inc.

Statement from Secretary Paige regarding the ACT study. (2004, October 14). Retrieved January 29, 2005, from http://www.ed.gov/print/news/pressreleases/2004/10/10142004.html

St. John, E.P., Simmons, A.B., & Musoba, G.D. (1999). Merit-aware admissions in public universities: Increasing diversity. *Policy Bulletin*. Indiana Education Policy Center, 1-8.

Stumpf, H., & Stanley, J., (2002). Group data on high school grade point averages and scores on academic aptitude tests as predictors of institutional rates. *Educational and Psychological Measurement, 62* (6), 1042-1052.

Test score and college admissions. (n.d.) Retrieved March 19, 2006, from http://www.petersons.com/testprepchannel/test_scores_and_admissions.asp

Valiga, M.J. (1986). *The accuracy of self-reported high school course and grade information* (ACT Research Report No. 87-1). Iowa City, Iowa: The American College Testing Program.

Watson, M.B., & Stead, G.B. (1990). Work-role salience of South African adolescents. *Journal of Vocational Behavior, 36*, 249-257.

Willingham, W.W., & Cole, N.S. (1997). *Gender and fair assessment*. Mahwah, NJ: Lawrence Erlbaum Associates.

Wood, R. (1993). *Assessment and testing*. New York: Cambridge University.

Zwick, R. (1999). Backdoor affirmative action. *Education Week*, pp. 56, 35.

APPENDIX A

LETTER TO MISSISSIPPI DEPARTMENT OF EDUCATION

June 26, 2006

To: Ms. Cindy Simmons, Director for Student Assessment

Mississippi Department of Education

My name is Gregory Stephens. I am a doctorial student in Instructional Systems, Leadership, and Workforce Development at Mississippi State University. I am completing my requirements with a dissertation entitled *The Effect of Selected Student Profile Variables in the 2005 American College Test (ACT) on Academic Performance of Mississippi High School Graduates as Measured by the sub-scales in the ACT*.
In this study, I am trying to determine if there is a difference between Mississippi high school graduates' ACT scores measured by the ACT sub-scale scores using variables in the Student Profile Section: (a) race or ethnicity, (b) gender, (c) class size, and (d) high school curriculum.
To find the needed results for my study, I am requesting your help in attaining the following information. To adequately collect a sample of the whole population of graduating seniors of 2005, I need the original, raw scores of the 2005 high school graduating seniors in Mississippi before they are averaged together in the Profile Report. The data needs to include the race or ethnicity, gender, class size, curriculum program courses, and their math, English, reading, and science reasoning sub-scale scores with composite scores for each. The specific Student Profile questions are #65, #79, #83, and Section E on the ACT Registration Folder.
I have contacted ACT, and ACT needs a letter from you to allow me to attain this information to complete my dissertation. If you have any questions, please contact me at (662) 418-1148 (cell), (662) 324-9596 (home), or (662) 262-4912 (work).
I thank you for your help and look forward to hearing from you.

Sincerely,

Gregory Stephens, Ed. S.
Principal, Montgomery County Elementary School

APPENDIX B

LETTER TO ACT, INC. FROM MISSISSIPPI DEPARTMENT OF EDUCATION

Mississippi Department of Education
Hank M. Bounds, Ph.D., State Superintendent of Education
Beth H. Sewell, Ed.D., Executive to the State Superintendent

Office of Academic Education
Kristopher J. Kaase, Ph.D. • Associate State Superintendent • 601-359-9714 • FAX: 601-359-9716
CindySimmons • Director • Office of Student Assessment • 601-359-3052 • FAX: 601-359-2471

July 18, 2006

Dr. Robert L. Ziomek, Director
Education and Workforce Research Services
Research
500 ACT Drive
P.O. Box 168
Iowa City, Iowa 52243-0168

The Mississippi Department of Education (MDE) has received your request to provide Mr. Greg Stephens, a Ph.D. candidate, 2005 ACT-tested public high school graduates' data. You may consider this letter the official response by the MDE that it recognizes your partnership with Mr. Stephens and acknowledges your plan of action as outlined below:

1) ACT will release to Mr. Stephens the MS 2005 ACT-tested public school results with all student, school, and district level identifying information removed.

2) ACT will instruct Mr. Stephens to destroy all ACT data once all of his analyses are completed and he has been awarded his degree,

Sincerely,

Cindy Simmons

APPENDIX C

LETTER TO MISSISSIPPI DEPARTMENT OF EDUCATION FROM ACT, INC.

Date: Thu, 6 Jul 2006

Dear Ms Simmons,

I have received a request from Mr. Greg Stephens for ACT 2005 ACT-tested public high school graduates data. Mr. Stephens is working on his PH.D. and initially contacted me requesting this information. I informed him that ACT DOES NOT release state data to third parties without permission from the appropriate state department of education authority. ACT can provide Mr. Stephens with the data he has requested as long as I have your approval to release the data to him.

This is what we will provide to Mr. Stephens. The MS 2005 ACT-tested public school results with all student and school level identifying information removed. (If you are interested in receiving a copy we can send you a CD at no charge.) We will also instruct Mr. Stephens to destroy all ACT data once all of his analyses are completed and he has been awarded his degree.

Sincerely,

Robert L.Ziomek, Ph.D.
Director, Education and Workforce Research Services
ACT Research and Development Division

APPENDIX D

LETTER FROM THE MISSISSIPPI STATE UNIVERSITY IRB

May 3, 2006

Greg,

Per our phone conversation, if you will only be using non-identifiable existing data, IRB approval is not necessary. Please let me know if you have any other questions.

Thanks,

Jonathan

Jonathan E. Miller
Compliance Administrator
Office of Regulatory Compliance