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# An Analysis of Tennessee Gateway Exams and the Variables Related to Student Results.

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*East Tennessee State University*

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An Analysis of Tennessee Gateway Exams and the Variables  
Related to Student Results

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A dissertation  
presented to  
the faculty of the Department of Educational Leadership and Policy Analysis  
East Tennessee State University

In partial fulfillment  
of the requirements for the degree  
Doctor of Education

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by  
Judy W. Webb  
December 2005

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Keywords: Gateway, Exit Exams, Tennessee, Graduation Requirements, Socioeconomic Status,  
Dropout Rate, Ethnic Minorities, Algebra, Biology, English, Standardized Testing

## ABSTRACT

### An Analysis of Tennessee Gateway Exams and the Variables Related to Student Results

by

Judy W. Webb

The purpose of this study was to examine the variables that are associated with the percentage of students who pass Tennessee's Gateway exams in high school. Associations were examined between the Gateway exams and variables such as: socioeconomic status, ethnicity, dropout rate, graduation rate, attendance, average daily membership, per-pupil expenditure, teachers' salary, and elementary-school reading scores.

Pearson correlations between school characteristics and pass rates of three Gateway exams were calculated. Schools were divided into quartiles based upon socioeconomic status and ethnicity in order to examine pass rates of the Gateway exams among different quartiles. Independent samples *t* tests were performed to determine if differences were statistically significant. Variables that exhibited strong association with pass rates of Gateway exams were used as predictor variables and pass rates of Gateway exams were used as dependent variables in multivariable linear regressions.

The findings indicated that the graduation rate and percentage of Caucasian students were most positively associated with Gateway pass rates. Dropout rates and percentage of students who qualified for free/reduced-priced meals were most negatively associated with Gateway pass rates. It was discovered that the Algebra I Gateway exam was by far the most difficult for students to

pass. Almost half of the students in high schools serving poor, minority students failed the Algebra I Gateway exam in 2004.

## DEDICATION

I dedicate this study to Tennessee students who are struggling to pass Gateway exams.  
May the state push you to excel while being fair in its assessment.  
To my best friend, Paul Webb: May it affect state policy.

## ACKNOWLEDGMENTS

My parents, Harrison and Jennie Whaley:

Thank you for teaching me to look for truth and not be afraid to stand for it. Thank you for your financial support.

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Thank you for being understanding about late dinners and no dinners.

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Thank you for praying for me and always encouraging me.

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Thank you for providing a place of rest and reflection.

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Thank you for your teaching. Thank you for inspiring me to stay the course and finish the task.

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Thank you for being kind in my mistakes, encouraging in my pursuits, and joyous with me at my study's end.

Dr. Connie Smith:

Thank you for listening to our concerns about Gateway testing and providing the data set used in this study.

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Thank you for being a beautiful park where Paul and I studied for so many hours. May you always, as FDR said, be a place "for the perpetual enjoyment of the people."

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## CHAPTER 1

### INTRODUCTION

In 1983, Tennessee began requiring high-school students to pass an exit exam before graduating with a regular diploma. The Tennessee Proficiency Test assessed students in language arts/reading and mathematics with standards equivalent to a sixth-grade level. In 1995, the exit exam was renamed the Tennessee Competency Test and students were again tested in language arts/reading and mathematics but the standards were raised to approximately those of the eighth-grade level. In the spring of 2005, Tennessee's students had to pass three Gateway exams in order to graduate. The tests were in Algebra I, English II, and Biology I and were considered to be on a 10th-grade level. Advocates of the exit exams have stated that the tests encourage schools and students to work harder. They maintain that the tests have caused curriculums to be better aligned with the state's standards and enable remedial and special courses to be added early on to address students' weaknesses. Critics of the mandatory exit exams suggest the tests encourage breadth rather than depth of subject matter, squeeze out content not covered in exams, and increase the drop-out rate for low-income and minority groups (Bowden, 2004).

Tennessee Gateway exams present challenges to state legislators, school administrators, teachers, and students. Of the 19 states that currently have mandatory high school exit tests, all have met with court challenges except Tennessee. Many experts suggested that too much is being tried too soon (Education Commission of the States, 2005b).

#### *Statement of the Problem*

The purpose of this study was to analyze the Tennessee Gateway exit exams and the demographic and test-score variables that are associated with each.

### *Significance of the Study*

The Tennessee high school senior class of 2005 was the first cohort to have some of its members not graduate because of failing a Gateway exam. It was a highly significant event for each senior who did not receive a diploma and his or her family. Nineteen states currently have exit exam requirements with more states planning to implement them in the future.

Tennesseans can learn from their experience while assessing the state's own experience. It is important for Tennessee to evaluate the impact of its policies especially on poor and minority students.

### *Limitations and Delimitations*

This study is limited to the data contained in the 2004 Tennessee Schools Report Card. A limitation of this study is the inability to match high schools with the elementary schools that supply them with students. Although 57 high schools include data on elementary classes, all high schools should be matched with their feeder elementary schools in order for analyses to be run on elementary characteristics associated with high-school students' performance on the Gateway Exam. However, even if the feeder schools were identified, their students' scores would have to be weighted. The different size of each school and the logistics involved in combining data from several elementary schools in order to do correlations or regressions with high schools is beyond the scope of this study. With over 200 variables available for each high school, there are plenty of analyses to run; however, the elementary data would have provided additional useful insights.

This study is limited to the 281 Tennessee schools in this data set. The *Tennessee School Directory* produced by the State Department of Education listed 288 public high schools in Tennessee. It also listed 23 public kindergarten- through 12<sup>th</sup>-grade schools and one public prekindergarten- through 12<sup>th</sup>-grade school for a total of 312 public schools that educated high

school seniors (Kniazewycz, 2005). Thirty-one schools were eliminated from the data set because of incomplete reports. A few high schools failed to report the percentage of students passing Gateway exams; others failed to report the percentage of students qualifying for free/reduced-priced meals or other pertinent data. This data set contains the 281 Tennessee public schools that reported Gateway exam passing rates and other data crucial for analysis. The sample represents over 90% of the Tennessee schools that served secondary students as reported in 2004 by the Tennessee State Department of Education.

This study is delimited to the state of Tennessee because of the data available and because 2005 was the first year diplomas were denied because of Gateway tests.

### *Research Questions and Hypotheses*

1. What are the mean and standard deviation of the percentage of students passing each of Tennessee's Gateway exams?
2. What school characteristics are most strongly associated with the percentage of students passing each of the three Gateway exams?
3. What combination of school characteristics yields the highest predictive value of the percentage of students passing the three Gateway exams?
4. What types of schools have the largest percentages of their students fail the Gateway exams?

From the research questions, the following null hypotheses were tested:

Ho1: There is no association between the percentage of students passing Gateway exams and socioeconomic status, ethnicity, dropout rate, graduation rate, attendance, average daily membership, per-pupil expenditure, teacher salary, and elementary reading scores.

Ho2: There is no difference in the percentage passing Gateway exams between schools with a high percentage of students who qualify for free/reduced-price meals and schools with a low percentage of students who qualify for free/reduced-price meals.

Ho3: There is no difference in the percentage passing Gateway exams between schools serving predominantly Caucasian students and schools serving a high percentage of minority students.

### *Definitions of Terms*

1. *Accommodations*: Education Law requires that any state that imposes an exit exam must provide appropriate accommodations for students with identified disabilities. All states provide accommodations as outlined in the students' IEP (O'Neill & Farr, 2000).
2. *Accountability*: Accountability refers to a system of checks and balances to guarantee appropriate outcomes. Educational accountability holds schools, teachers, and students accountable for their performance. School accountability refers to a state making the school responsible for students' performance. If adequate school performance does not occur, actions by the state could include ranking the school, assigning the school to a low-performing list, or removing administrative staff. Student accountability might include grade retention or withholding a high school diploma (Morgan, Moore, Detch, & Walton, 2004).
3. *Achievement Gap*: The variation in test scores tied to racial or ethnic differences (Landgraff, 2001).
4. *Average Daily Membership (ADM)* - The average number of students enrolled in a particular school (State of Tennessee Department of Education, 2000).
5. *Alignment*: Alignment is assessment that measures state standards according to the test that is given.

6. *Adequate Yearly Progress (AYP)*: This is a measure designed to track annual progress as defined by *No Child Left Behind* (State of Tennessee Department of Education).
7. *Carnegie Unit*: A Carnegie unit was developed in 1906 as a measure of the amount of time a student has studied a subject: 120 hours in one subject – meeting 4 or 5 times a week for 40 to 60 minutes for 36 to 40 weeks each year – earns one “unit” of high school credit (Carnegie Foundation, 1993).
8. *Core Curriculum*: All Tennessee students are required to complete the core curriculum: four units of English, three units of math, three units of science, three units of social studies, and one unit of physical fitness (State of Tennessee Department of Education).
9. *Disadvantaged Students*: Disadvantaged students are considered as those who are eligible to participate in the free or reduced-price lunch program. Eligibility for free or reduced-price lunch is based upon family income. Effective July 1, 2005, children in a family of four making less than \$25,155 are eligible for free meals whereas those making less than \$35,798 qualify for reduced prices (USDA Food and Nutrition Service, 2005).
10. *Education Improvement Act of 1992*: This *Education Improvement Act* was passed by the Tennessee General Assembly and signed by then-Governor Ned McWherter in 1992. The act incorporated many education reforms that included: class size requirements, Basic Education Program funding, and the exit exams for graduation from high school (Tennessee State Department of Education, 2004).
11. *English Language Learner (ELL)*: Students whose first language is not English (Morgan et al.).
12. *English as a Second Language (ESL)*: The program that assists English language learners (Morgan et al.).



13. *Education Reform Act of 2001*: The *Education Reform Act* was passed by the Tennessee General Assembly and signed by then-Governor Don Sunquist in 2001. The act was not funded by the General Assembly. The main tenets of the act included a reading initiative, a prekindergarten initiative, and a “Catching Up” program aimed at 7<sup>th</sup> and 8<sup>th</sup> grade students who were likely to fail the Gateway exams (Morgan et al.).
14. *End-of-Course Exam*: An assessment given to students upon completion of a particular subject, the purpose of which is to measure material taught in a course. End-of-course exams taken in 2005 in Tennessee were: Algebra I, Foundations II, Biology I, English I, and English II, three of which were Gateways (Morgan et al.).
15. *Gateway Exams*: Tests implemented in the fall of 2001 in English II, Algebra I, and Biology I. Students must pass each Gateway test to receive a regular high school diploma. Students take the exams for the first time upon completion of the corresponding course. Students who fail one or more of the exams have several additional opportunities to retake and pass the exams before graduation (Morgan et al.).
16. *High-Stakes Testing*: High-stakes tests are tests that a student must pass to graduate. These scores must be met: Algebra I- 30, English II –27, and Biology-20 (Tennessee Department of Education, 2005a).
17. *IEP Diploma*: The Individualized Educational Program diploma is a high school diploma awarded to special education students who have successfully completed the program outlined in his or her IEP. Many states refer to this diploma as a certificate of attainment or certificate of attendance (WNY Collegiate Consortium of Disability Advocates, 2004).
18. *School Wide Improvement*: Each high school develops a shared mission and vision, school-wide goals, and a school improvement plan that is based on a needs

- assessment. In working for continuous improvement, the school collects and uses student assessment information, program evaluation information, and other appropriate data (State Department of Education, 2003).
19. *Standard or Regular Diploma*: A regular or standard diploma is obtained by passing 28 Carnegie units of class work and passing three Gateway Tests in Algebra I, Biology I, and English II (Taylor, 2004).
  20. *TACIR*: The Tennessee Advisory Commission on Intergovernmental Relations (2002) was created to monitor federal, state, and local government relations and to make recommendations to the Legislature for improvement.
  21. *Tennessee Value-Added Assessment System*: A statistical analysis of student achievement that uses the Gateways to measure gains in student, school, and teacher achievement (Tennessee Department of Education, 2004b).

### *Overview of the Study*

Assessment in Tennessee high schools has changed dramatically in recent years in an effort to accommodate federal and state standards. The 2004/2005 school year was the first year Tennessee students had to pass three Gateway exams to receive a high school diploma. The Gateway exams are designed to be on a 10<sup>th</sup> grade level in Algebra I, English II, and Biology I. Tennessee students must score 30 in Algebra I, 27 in English II, and 20 in Biology I. The majority of students in the state are passing the exams, but many are failing.

Data furnished by the Tennessee State Department of Education provided an abundance of information to perform statistical analyses. This researcher computed the mean, range, and standard deviation of the percentage of students passing each of the three Gateway exams. This study provided information about which Gateway test was most difficult to pass and noted those school characteristics that were most strongly associated with each test. In addition, the analysis noted which types of schools were more likely to have large percentages of students that fail the

Gateway exams. Chapter 2 contains a review of literature pertinent to the study. Chapter 3 describes the methodology of the study. Chapter 4 presents the results and Chapter 5 offers some conclusions and suggestions of alternatives that Tennessee assessment can use to balance the integrity of a high school diploma with respectable accountability, thereby avoiding court challenges that other states have faced in attempting to require mandatory high school exit exams (Heubert, 2002; Togut, 2004).

## CHAPTER 2

### REVIEW OF THE LITERATURE

The history of education in America began with America's first settlers. Europeans brought with them not only a love of adventure but also of learning, a love that has grown and flourished. Martin Luther had taught many Europeans the importance of education. According to Kreis (2004), Martin Luther said in 1517, "Out of love for the truth and the desire to bring it to light, the following propositions will be discussed at Wittenberg" (p.1). Unscrupulous clergymen could easily dupe Christians who were unable to read the Bible.

The early settlers knew that they and their children must be educated or risk becoming pawns of the lettered class. To read, to write, and to discern the truth for themselves became a need as great as clear drinking water. Early Americans brought with them to the new world a love of God and a love of learning that would establish elementary schools, high schools, and colleges. A high school diploma would stand for greater wisdom and preparation for college.

Since those early days, the requirements for high school graduation have been ever changing. Curriculum and accountability measures are drastically different than they were 100 years ago. In 2004 in Tennessee's public schools, 46,096 high-school students received a regular high school diploma, 3,428 received special education diplomas, and 679 received certificates of attendance (Tennessee Department of Education, 2004a). The Tennessee high school graduates of 2004/2005 met requirements unheard of years ago. Not only does a high school diploma stand for greater wisdom and an opportunity for college, but it also comes with increased potential. In the modern world, a student without a high school diploma is generally destined for menial tasks and a lower standard of living. According to the National Center for Education Statistics (2001), students without a high school diploma will earn \$212,000 less in their lifetime than will high school graduates and \$812,000 less than will college graduates. A high school

diploma has become as essential as clear drinking water was for the early settlers. It can be a rite of passage for many who would live well.

### *Education in America: 1600-1700*

Jamestown, Virginia, and Plymouth, Massachusetts, were the first permanent English settlements in America. Schools were organized quickly, and in 1647, the Massachusetts Colony passed the *Old Deluder Satan* Act. As cited in the American Colonist's Library (2004):

It being one chief object of that old deluder, Satan, to keep men from the knowledge of the scriptures... it is therefore ordered, that every township, after the Lord hath increased them to the number of fifty householders, ...shall...appoint one within their town to teach all children as shall resort to him to read and write. It is further ordered, that where any town shall increase to the number of one hundred families... they shall set up a grammar school, the master thereof being able to instruct youth so far as they may be fitted for the university. (p.1)

Old-field schoolhouses were common in the South, but were only open a couple of months out of the year. Secondary schools of the Latin grammar type were necessary for college preparation. New York, Pennsylvania, New Jersey, and Maryland had such schools. Benjamin Franklin's academy in Philadelphia opened in 1751 and became a model for others. Franklin was particularly interested in training teachers and officials for the government. His school offered a variety of subjects, including vocational, and introduced the American comprehensive high school (Franklin, 2002).

Boston had a free Latin grammar school and many other New England towns established secondary schools and paid tuition to a headmaster or minister who was agreed upon by both parties. Boys usually entered at the age of eight and the schooling lasted for six to eight years. The curriculum was in Latin, Greek, and Hebrew. The young men attending such secondary schools hoped to be admitted to Harvard. Harvard was established in 1636, Yale College in 1701, and Dartmouth in 1769. All three were similar in curriculum with Latin as a prerequisite requirement (Pulliam & Van Patten, 2003).

The *Declaration of Independence* and the American Revolution changed the way Americans looked at education in many ways. John Locke's writings in 1609 influenced many of the founding fathers, including Thomas Jefferson. Locke published *Thoughts Concerning Education* in 1693. It was evident that Jefferson considered Locke's writing when he penned the *Declaration of Independence*. "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable rights, that among these are life, liberty, and the pursuit of happiness" (cited in *Declaration of Independence*, 1995, p.1).

According to Thattai (2001), Locke denied the existence of innate ideas; instead, he stated that an individual was a blank slate, or *tabula rasa*. Jefferson contended that the national *tabula rasa* should be written by all the people, for all the people. He said that an educated populace was the greatest safeguard of a democracy. He added that the free press would keep the people informed and discerning voters would elect good leaders. After the *Declaration of Independence* was signed, 14 states adopted their own constitutions. In 1791, 7 of the 14 newly established states made provisions for education. Jefferson stated that education should be under government control free from religious bias and available to all regardless of one's ability to pay (Thattai). Jefferson started one of the first state universities, the University of Virginia. He planned the curriculum, hired the faculty, and supervised the entire school from his home in Monticello. He could see it from his front yard (World Heritage, 1987).

In 1787, Congress introduced the *Northwest Ordinance* in support of schools. Revenue generated from the sale of a portion of each township in the state went to fund public education; this was the first instance of federal aid for education in American history (Public Broadcasting System, 2003). Each state carved out of the Northwest Territory was required by the ordinance to establish townships of 36 square miles with one square mile devoted to public education. Article three of the ordinance stated, "Religion, morality, and knowledge, being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged" (Avalon Project of Yale Law School, 2005, p.1).

### *Education in America: 1800s*

For the most part, only families who could pay a teacher or afford tuition to an academy could send their children to school. Before the War of 1812, most schools were religious in nature and few held the belief that education was first and religion, second. The start of grading can be traced to 1818 when the Boston Primary School organized six classes with the secondary school forming in the seventh grade (Pulliam & Van Patten, 2003). Reciting, reading, arithmetic, and spelling were ordinary subjects of the day. Children whose families could pay tuition attended such schools. Horace Mann of Massachusetts published the *Common School Journal* that focused the public's attention on educational issues. Mann argued that schools could create good citizens, unite society, and prevent crime. As a result of his efforts, free public education was available for elementary children by the end of the 19<sup>th</sup> century. Massachusetts passed the first compulsory school attendance laws in 1852, followed by New York in 1853 (Thattai, 2001).

The *Morrill Act* of 1862 provided federal financial support to state universities and created more opportunity to attend college. Many land grant colleges and state universities were established through federal land grants to the states for the support of higher education.

According to the U.S. Statutes at Large (2004), the *Morrill Act* stated:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there be granted to the several States, for the purposes hereinafter mentioned, an amount of public land, to be apportioned to each State a quantity equal to thirty thousand acres for each senator and representative in Congress to which the States are respectively entitled by the apportionment under the census of eighteen hundred and sixty. (p. 1)

Thomas Jefferson's dream that all men should be treated as equal was never realized in his lifetime. African Americans were denied the rights of most American citizens.

Fredrick Douglass published his *Narrative of the Life of Fredrick Douglass, an American Slave* in 1845 (Douglas, 1845/2004). He wrote:

Mrs. Auld [Douglass's new slave owner] commenced to teach me the ABCs. After I had learned this, she assisted me in learning to spell words of three or four letters. Just at this

point of my progress, Mr. Auld found out what was going on, and at once forbade Mrs. Auld to instruct me further, telling her, among other things, that it was unlawful, as well as unsafe, to teach a slave to read. Mr. Auld said, 'It would forever unfit him to be a slave. He would at once become unmanageable, and of no value to his master. As to himself, it would make him discontented and unhappy.' These words sank deep in my heart, stirred up sentiments within that lay slumbering, and called into existence an entirely new train of thought. It was a new revelation, explaining dark and mysterious things, with which my youthful understanding had struggled, but struggled in vain. I now understood what had been to me a most perplexing difficulty—to wit, the white man's power to enslave the black man. It was a grand achievement, and I prized it highly. From that moment, I understood the pathway from slavery to freedom. Though conscious of the difficulty of learning without a teacher, I set out with high hope, and a fixed purpose, at whatever cost of trouble, to learn how to read. The very decided manner with which he spoke, and strove to impress his wife with the evil consequences of giving me instruction, served to convince me that he was deeply sensible of the truths he was uttering. It gave me the best assurance that I might rely with the utmost confidence on the results, which, he said, would flow from teaching me to read. What he most dreaded, that I most desired. That which to him was a great evil, to be carefully shunned, which he so warmly urged against my learning to read, only served to inspire me with a desire and determination to learn. (p. 45)

African Americans did not receive freedom until the 13<sup>th</sup> Amendment of 1865 and their rights were further protected in the 14<sup>th</sup> Amendment. In 1868, the 14<sup>th</sup> Amendment proclaimed:

All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the state wherein they reside. No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States or shall any state deprive any person of life, liberty, or property, without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws. (U.S. Constitution, Amendment 14)

It was nearly a century after the Civil War before African Americans began fully to inherit the freedoms and protection promised by the United States *Constitution*.

In 1875, there were fewer than 25,000 students enrolled in public high schools. The era of the elementary school had established the principle of free, tax-supported elementary schools, but taxation for high schools was still debated. Public high schools were not free and many argued that high schools should be tax-supported. According to Timmerman (2000), citizens in Kalamazoo, Michigan, created a free public high school in 1858 and three taxpayers contested it. The case went to the state supreme court in 1859. Justice Cooley held that high schools were common schools that constituted a vital link between elementary schools and the state university.



He pointed out that the absence of public secondary schools would discriminate in favor of the rich and thus prevent others from entering college. The decision became a precedent that established the right of the states to levy taxes for public high schools (Timmerman).

As high schools were being organized across the country, concerns were expressed as to what subjects should be offered, offered to whom, and for what duration. A separate debate focused on what subjects should be required for college entrance. Some high schools offered vocational classes, such as carpentry and masonry, to young men whereas girls were taught domestic industrial arts in preparation for marriage. Other high schools offered Greek, Latin, and mathematics to prepare their students for college. As reported by Wolverton (2003), in the 1890s, nearly half of the nation's colleges had either low entrance requirements or none at all. Harvard, Princeton, and Columbia demanded that applicants be able to read and summarize Cicero, Virgil, or other classical authors, write Latin in prose, know rules of *Prosodia*, and translate chapters of the *Book of John* from Greek into Latin.

In 1892, the newly formed National Education Association (NEA) appointed the Committee of Ten to examine the high school curriculum and to make recommendations about methods, standards, and programs. United States Commissioner of Education, William Harris, served on the committee and Harvard President Charles Eliot was its chairperson. Both men were well known among educators as reformers and proponents of modern subjects. The Committee of Ten published its report in 1893. It recommended that a few subjects should be taught for a long period. It supported an eight-year elementary school and a four-year high school. The Committee of Ten influenced the Committee on College Entrance Requirements that was established in 1895 (Ravitch, 2000).

#### *Education in America: 1900s*

In 1902, the NEA's North Central Association set up a Committee on Unit Courses. The committee required 15 units for high school graduation and recommended at least 3 units of

English and 2 of mathematics for college entrance. These requirements became standard requirements of accreditation for all high schools (Pulliam & Van Patten, 2003). In 1906, a standard unit of credit for high school subjects was developed called the Carnegie unit. The Carnegie unit was a measure of the amount of time a student had studied a subject. A sum of 120 hours in one subject, meeting 4 or 5 times a week for 40 to 60 minutes for 36 to 40 weeks each year earned the student 1 “unit” of high school credit (Boyer, 1993).

These requirements met with much criticism. According to Ravitch (2000), W. R. Butler, a Massachusetts educator, stated that he could not believe that the same classes offered to prospective college students would be offered to ordinary students. He stated, “No builder thinks of laying the same foundation for a cottage as for a 10-story block. Most high-school students are girls, and the higher education of girls is of doubtful utility to the race” (p. 44).

While Caucasian educators were defining curriculum and standard units of study for the public high schools, African-American educators were struggling with the process of publicly supported elementary schools for African-American children. In 1890, only one third of African-American children attended any school whatsoever, and far fewer had access to high schools. Booker T. Washington, born into slavery, was educated at Hampton Institute at Virginia. He was a master fundraiser and started Tuskegee Normal School for African Americans in Alabama. He advocated vocational studies for African Americans. Booker T. Washington wrote in 1892, “In all things that are purely social we can be as separate as the finger, yet one as the hand in all things essential to mutual progress” (Public Broadcasting System, 2004, p. 1).

W.E.B. Du Bois took a different stance. Du Bois was an intellectual African American who graduated from Fisk University and received a doctorate from Harvard. Du Bois promoted the idea of the Negro’s Talented Tenth. According to the Teaching American History Organization (2002), Du Bois wrote the following in September of 1903:

How then shall the leaders of a struggling people be trained and the hands of the risen few strengthened? There can be but one answer: The best and most capable of their

youth must be schooled in the colleges and universities of the land. We will not quarrel as to just what the university of the Negro should teach or how it should teach it — I willingly admit that each soul and each race-soul needs its own peculiar curriculum. But this is true: A university is a human invention for the transmission of knowledge and culture from generation to generation, through the training of quick minds and pure hearts, and for this work no other human invention will suffice, not even trade and industrial schools. (p. 3)

According to Hartin (1997), by 1915, 90% of African Americans lived under Black Codes. The Black Codes restricted the freedom of freed slaves by limiting their right to vote, engage in certain occupations, and participate in the judicial system. The Supreme Court Case of *Plessy v. Ferguson* strengthened the Black Codes. In 1890, Louisiana passed a statute stating that train passengers would be provided coaches of equal but separate accommodations for the White and Black races. Homer Plessy maintained that under the 14<sup>th</sup> Amendment, separate was unconstitutional. The Supreme Court rejected Plessy's argument, and other states adopted Black Codes (Hartin). Over half a century passed before "separate but equal" was ruled unconstitutional. In the Supreme Court case of *Brown v. Board of Education* in May of 1954, Chief Justice Warren delivered the opinion of the court stating, "We conclude that, in the field of education, the doctrine of separate but equal has no place" (National Center for Public Policy Research, 2002, p. 1).

The outbreak of World War II compelled 16 million young Americans to join the military. President Franklin D. Roosevelt signed the Servicemen's Readjustment Act of 1944 better known as the GI Bill of Rights that invested in the education and training of returning veterans. According to Education Webmaster (2000), to be eligible for GI Bill education benefits, a World War II veteran had to serve 90 days or more after September 16, 1940, and have an honorable discharge. Veterans of the war were entitled to one year of full-time training plus a period equal to their time in service, up to a maximum of 48 months. Veterans who had graduated from high school accounted for 49% of the college enrollment in 1947. Many of these veterans became the teachers, doctors, lawyers, and college presidents of a new era (Education Webmaster). These young men and women of all races not only acquired an education but they

also saw the need for expanding the educational opportunities of their children. Their experiences abroad had made them realize the complexities of a modern world, and they soon demanded their children be prepared for it.

### *Tennessee Education: 1900s*

Tennessee was the first southern state to enact a compulsory school attendance law. By 1922, all Tennessee children between the ages of 8 and 16 were required by law to attend school (*Tennessee Education Laws Annotated*, 2000). In 1947, the Tennessee State Legislature levied the state's first retail sales tax and allotted 80% of the proceeds to the public schools. In 1953, free textbooks were issued to all students in Tennessee in grades 1 through 12 (Tennessee Department of Education, 2005b).

Tennessee was greatly affected by President Lyndon Baines Johnson's *Economic Opportunity Act* of 1964. As cited in Halsall (1998), President Johnson stated:

Because it is right, because it is wise, and because, for the first time in our history, it is possible to conquer poverty, I submit, for the consideration of the Congress and the country, the *Economic Opportunity Act* of 1964. It charts a new course. It strikes at the causes, not the consequences of poverty. It will give almost half a million underprivileged young Americans the opportunity to develop skills, continue education, and find useful work. (p. 1)

Halsall also noted the following from President Johnson's *State of the Union Address* in 1964 when he addressed the nation with these words:

The program I shall propose will emphasize this cooperative approach to help that one-fifth of all American families with incomes too small to even meet their basic needs. It will call for total expenditures of 97,900 million dollars—a reduction of more than 500 million. I am able to recommend in this reduced budget the most Federal support in history for education, for health, for retraining the unemployed, and for helping the economically and the physically handicapped. (p. 1)

This federal support started a program in Tennessee known as Chapter One. In 1965, its name was changed to Title I in the *Elementary and Secondary School Act* of 1965. The *Elementary and Secondary Education Act* provided children from low-income homes more educational services than it did children from affluent homes. Title I funding allocated one

billion dollars to schools with high numbers of students who came from low-income families. This was the beginning of free and reduced-price lunch to disadvantaged students; a Head Start program that would begin for preschool students; a Follow-Through program that would continue to benefit students originally in the Head Start Program; and Bilingual Education, benefiting students that had limited or no English proficiency. It would also allow guidance-counseling services for every school (Schugurensky, 2003, p. 1). President Johnson stated to Congress, “For every one of the billion dollars that we spend on this program, will come back tenfold as schools’ dropouts change to school graduates” (as cited in Schugurensky, p. 1). The *Elementary and Secondary Education Act* not only brought about Head Start and guidance counseling, but it also provided free funding for adult education programs and higher education as well.

By 1980, Tennessee had raised its required graduation credits to 18 Carnegie units (National Center for Education Statistics, 2003). In 1981, the Tennessee General Assembly passed legislation establishing the first high school graduation exam in Tennessee: the Tennessee Proficiency Test. The Tennessee Proficiency Test assessed high-school students’ basic knowledge in two academic areas: mathematics and language arts/reading. The standards of the exam were on a sixth-grade level (Morgan et al., 2004).

In 1983, the Secretary of Education, T. H. Bell, created the National Commission on Excellence in Education and directed the Commission to present a report on education in America. The report was called *A Nation at Risk*. According to the National Commission on Excellence in Education (1983), some of the findings of this study pertaining to the state of education in 1983 were:

1. about 13% of all 17-year-olds in the United States could be considered functionally illiterate;
2. functional illiteracy among minority youth might run as high as 40%;

3. average achievement of high-school students on most standardized tests was lower than 26 years ago when Sputnik was launched; and
4. between 1975 and 1980, remedial mathematics courses in public four-year colleges increased by 72% and constituted one quarter of all mathematics courses taught in those institutions. (p. 3)

*A Nation at Risk* caused concern in the nation and in Tennessee.

In 1984, the Tennessee General Assembly enacted Governor Lamar Alexander's *Better Schools Program* that brought Tennessee to the national forefront in education reform. *The Public Education Governance Act* of 1984 established a new, more independent State Board of Education "with its own staff separate and apart from the State Department of Education" (Tennessee Department of Education, 2005b, p. 3)

In 1988, Tennessee added to the graduation requirements two courses of the same foreign language and two courses of visual arts for students who chose to go to college. Tennessee gave diplomas for two paths of learning: one a college path and the other a vocational route. Tennessee further added one half credit of economics. For the vocational path, students were expected to complete four courses in the same vocational educational program (National Center for Education Statistics, 2003).

In 1993, the Supreme Court of Tennessee ruled, in *Tennessee Small School Systems v. McWhorter*, 851 S.W.2d 139, that the state's education finance system violated the Tennessee Constitution's equal protection clause. While the 1993 decision was pending before the Supreme Court, the Tennessee legislature enacted the *Educational Improvement Act* of 1992. The bill included the Basic Education Program (ACCESS, 2001). The state of Tennessee raised the required classes for high school graduation to 20 Carnegie units. Required classes for the college path were: four in English, two in math, one in social studies, two in science, one and one half in physical education and health, two classes in the same foreign language, two in visual arts, and one half credit for economics. The vocational path exempted students from foreign language

classes and required six courses in the same vocational education program (National Center for Education Statistics, 2003).

In 1992, the Tennessee General Assembly adopted the *Education Improvement Act* that implemented the 21<sup>st</sup> Century Schools education reform program. The program established a new state-funding formula for public school systems that would more evenly distribute state funds to local school systems. It incorporated a new local governance structure for public education and a system of accountability that required local schools and school systems to meet state goals and standards (Tennessee Department of Education, 2005b). In 1992, the Tennessee State Legislature adopted William Sanders' method, known as the Value-Added Assessment System, to measure systems', schools', and students' academic gains as well as teachers' effectiveness (Sanders & Horn, 1994). Sanders is a statistician who for the past decade (1994-2004) has measured students' achievement and the effects teachers and schools have on academic progress for the state of Tennessee. He began working in education in 1984, developing a statistical procedure for identifying teachers' eligibility for merit pay (Professional Association of Georgia Educators, 2003). In 1992, after the state Legislature adopted the *Education Improvement Act*, it was necessary to provide accountability measures to meet federal standards. The Tennessee Legislature passed the subject matter tests for secondary schools in 1992.

*Tennessee Education Laws Annotated*, Section 49-1-608, in 2003 stated:

By not later than 1993, the development of subject matter tests will be initiated to measure performance of high-school students in subjects designated by the State Board of Education and approved by the Education Oversight Committee. These tests must reflect the complete range of topics covered within the list of state approved textbooks for that subject. As soon as valid tests have been developed, the testing of students will be initiated to provide for value-added assessment. Dr. Sanders' Tennessee Value-Added Assessment (TVAAS) shall be initiated in the designated subjects within secondary schools by 1999-2000 school year, and continue annually thereafter. Value-added assessment may be initiated in other subjects designated by the State Board of Education and approved by the education oversight committee at such times as valid tests can be developed that effectively measure performance in such subjects. (p. 146)

In response to the *Education Improvement Act* of 1992, the state Board of Education raised standards for the Tennessee Proficiency Test from a sixth-grade level to an eighth-grade

level. Students first took the test during their ninth grade and were offered repeated opportunities to pass the exam throughout high school. In the last year of the sixth-grade level proficiency test in 1993-1994, 90% of high-school students passed the math portion and 86% passed the language section. The first year that the test was raised to an eighth-grade level and renamed a Competency Test, only 66% passed the math section, and 78% passed the language arts/reading section. The Competency Test results for this cohort revealed a significant achievement gap between specific subgroups such as minorities and special education students (Morgan et al., 2004).

Since America's founding, education was considered as essential to a better life as was drinking water, but it was beginning to drown those with less hardy natures. To receive a diploma, a senior had to pass 20.5 Carnegie units of study as well as the Competency Test (National Center for Education Statistics, 1995).

### *Goals 2000*

On March 31, 1994, President William Jefferson Clinton signed into law the *Goals 2000: Educate America Act*. These goals were designed to encourage schools to focus on learner outcomes. Pulliam and Van Patten (2003) recorded the goals as being:

1. All children will start school ready to learn;
2. the high school graduation rate will increase to at least 90%;
3. students completing grades 4, 8, and 12 will have competency in academic subject matter including English, mathematics, science, history, and geography;
4. students in the United States will be first in the world in mathematics and science achievement;
5. every school will be free of drugs and violence;
6. schools will offer an environment conducive to learning;
7. every school will promote partnerships to increase parental involvement;



8. the nation's teaching force will have access to programs for continuous improvement of their professional skills and knowledge; and
9. every American adult will be literate and possess knowledge and skills to compete in the world economy. (p. 305)

State and local implementation of *Goals 2000* focused on ensuring that all children had high academic standards. The emphasis on results brought change in these areas: (a) curriculum and instruction, (b) professional development, (c) assessment and accountability, (d) school and leadership organization, and (e) parental and community involvement. The success of *Goals 2000* was tied to the states' progress in implementing standards-based reform and its respective elements (Education Government Publications, 1998). *Goals 2000* affected every state, including Tennessee. According to Malico (1999), Richard Riley, Secretary of Education, announced at Bradley County Junior High School, "Whether you use these dollars to get computers into the classroom, whether you use *Goals 2000* to give your teachers training, or whether you use it to get more parents involved--that is your choice" (p. 1). Tennessee's first-year *Goals 2000* grant was for \$1, 677,460.00. Forty-eight states and nine territories received almost \$85 million in first-year *Goals 2000* support (Malico). In Tennessee, funds from *Goals 2000* allowed educators to put computers in the classroom, add computer labs, and train teachers in using computers.

The Clinton administration's *Goals 2000* was intended to increase equality in schools without federal mandates. Unfortunately, the funding for *Goals 2000* was discontinued, but many other components remained. As noted in Education Government Publications (1998), *Goals 2000* also required:

Each State's improvement plan shall establish strategies for improved governance, accountability and management of the state's education system, such as: aligning responsibility, authority, and accountability throughout the education system, so that decisions regarding the means for achieving state content standards and state student performance standards are made closest to the learners. (p. 5)

Education Government Publications cited the president of the National Center on Education and the Economy, Marc Tucker's response, "When everyone needed to reach high levels for the first time in American history, we discovered that we had never come to any consensus on what the students needed to achieve" (p. 2).

The *Education Improvement Act* required the development of end-of-course tests for all high school subjects. According to Morgan et al. (2004), TCA 49-6-6001 specified, "A student shall pass the TCAP tests as adopted by the state board of education to receive a full diploma upon graduation from high school" (pp 5-6). Those end-of-course tests represented the accountability side of the Educational Improvement Act's balance between increased flexibility/funding and standards/accountability.

In October 1998, the General Assembly's Select Oversight Committee on Education approved the Tennessee State Board of Education's policy identifying 10 end-of-course examinations for 10 high school subjects 3 of which were called Gateway exams for a high school diploma. The end-of-course tests were: Math Foundations II, Algebra I, Algebra II, Geometry, English I, English II, Physical Science, Biology I, Chemistry, and United States History. The Gateway end-of-course tests required for a regular high school diploma were: Algebra I, English II, and Biology.

### *No Child Left Behind for High School*

According to the U. S. Department of Education (2004), President George W. Bush, on January 8, 2002, signed the *No Child Left Behind Act* that outlined educational reform based on: "(a) stronger accountability for results, (b) more freedom for states and communities, (c) encouraging proven educational methods, and (d) more choices for parents" (p. 1).

Under the *No Child Left Behind Act*, states are working to close the achievement gap and ensure all students, including those who are disadvantaged, achieve academic proficiency.

Annual state and school district report cards inform parents and communities about state and school progress (U. S. Department of Education, 2003).

Criteria for placing high schools on notice are having below average scores in at least two of the following: Algebra I end-of-course exam, 11<sup>th</sup>-grade writing exam, and/or the ACT (Tennessee Department of Education, 2001). In addition, high schools must meet the following federal benchmarks:

1. 95% participation rate on all state assessments;
2. required proficiency in math Gateway tests;
3. required proficiency in reading/language arts as determined by English Gateway tests;
4. required proficiency in writing assessment; and
5. 60% graduation rate for the school year, excluding GED and special education diplomas. (pp. 34-35)

At the heart of *No Child Left Behind* is an assessment and accountability system designed to identify and assist schools and districts that do not meet standards for student performance. According to the Tennessee Department of Education (2004a), schools that do not meet the federal benchmarks will be assisted by the state under the following criteria:

1. The first year a school does not meet federal standards, it is given a warning, and the State Department of Education offers technical assistance.
2. The second consecutive year, if a school does not meet federal benchmarks, the school is placed in 'school improvement' that triggers a number of initiatives aimed at raising school performance. At this stage, parents of students in Title I schools are offered supplemental educational services, such as tutoring, at no cost.
3. In schools put on notice for the third consecutive year, the state works with the school district and school staff to develop an intensive improvement plan to channel additional resources toward improving school performance and no cost tutoring for students.

4. The fourth year that the school has not made improvements, the State Department of Education must take action such as removing school staff, increasing the length of the school day or year, or decreasing the authority of local management.
5. The fifth year the school has not made improvements the school district will prepare a plan for restructuring the school or district with options including conversion to a charter school, replacing existing staff, taking over management or contracting with a private entity to take over management.
6. The sixth year of no school improvement the State Department of Education will implement the plan devised of Corrective Action. (p. 2)

Riechmann (2005) reported that George W. Bush, during a visit to the J.E.B. Stuart High School, stated:

Testing is important. Testing at high school levels will help us become more competitive as the years go by. Testing in high schools will make sure that our children are employable for the jobs of the 21<sup>st</sup> century. Testing will make sure the diploma is not merely a sign of endurance, but the mark of a young person ready to succeed. (p. 1)

Tennessee met the *No Child Left Behind Act's* high school testing requirements through the Gateway exams: Algebra I for the math requirement, English II for the reading requirement, and Biology I for the science requirement. The *No Child Left Behind Act* did not require graduation-contingent test or exams leaving this decision to individual states. The choice to link Gateway performance and receipt of a regular high school diploma was a Tennessee choice (Morgan et al., 2004). For Tennessee students, that meant new challenges.

Tennessee graduates too few students regardless of the exit examination. Data show that even before full implementation of the Gateway exams, Tennessee already had approximately 35% of students in the 1999 cohort unable to obtain a regular high school diploma because of Competency Test failure. Tennessee, according to Carol R. Johnson in a memorandum to the Honorable Randy McNally, Chairman of the Senate Education Committee, "has a high school graduation problem regardless of the assessment of Gateway exams or Competency tests" (as cited in Wood, 2004, p. 18).

*Tennessee's 2005 Gateway Exit Exams*

The 2005 Gateway Exams are roughly equivalent to a 10<sup>th</sup>-grade level. The State Board of Education's High School Examinations Policy outlined the rationale for Gateway testing in Tennessee, including: (a) improvement of school learning in core content areas; (b) preparation for further learning; (c) diagnostic information on students' performance; (d) school and program improvements; and (e) accountability for students, teachers, schools, and school systems (Tennessee State Board of Education, 2002, p. 1). Students who started high school in the fall of 2001 or later must score as proficient or advanced on all the Gateway tests in order to receive a diploma. The Gateway Exit Exams are Algebra I, Biology I, and English II. Each test has 62 questions and is not timed. The law requires that these tests count as 15% of the student's course grade. The State Department of Education has proficient and advanced cut-scores for each test. The Tennessee Department of Education (2005a) listed the number of questions that must be answered correctly to score proficient and advanced; this information is presented in Table 1.

Table 1

*The Number of Questions That Must be Answered Correctly to Score Proficient and Advanced on Each of the Gateway Exams*

Gateway Exam Scores	Algebra I	English II	Biology I
Proficient	30	27	20
Advanced	42	41	36

As noted by the Tennessee Department of Education (2005a), students who failed any test would have opportunities to retake the test throughout their high school career and during the summer semester. Chudowsky, Hamilton, Gayler, Yeager, and Kober (2004) provided the pass

rates for the first time test-takers in 2003-2004 as shown in Table 2. Final results will not be available until fall of 2005.

Table 2

*Pass Rates on Gateway Exams for the Nine Subgroups Required by NCLB*

Subgroups	Algebra I	English II	Biology I
All students	75%	87%	95%
Caucasian	85%	90%	97%
African-American	52%	78%	89%
Hispanic	71%	83%	92%
Asian	87%	90%	97%
Native American	76%	83%	90%
English Language Learner (ELL)	60%	55%	81%
Free/Reduced-Price Lunch	61%	77%	90%
Disability Students	41%	43%	75%

*Gateway Exit Exam Concerns*

Concern for the failure rate of Tennessee's students on the Gateway exam centers on socioeconomically disadvantaged students, African-American students, English Language Learners, and Special Education students. Mendez (2004) cited Gary Orfield, the co-director of the Civil Rights Project at Harvard University, who pointed out, "A lot of poor kids, poor minority kids in inadequate schools are facing a dead end" (p. 2). The test score gap between African American and Caucasian students narrowed following *Brown v. Board of Education*, (347 U.S. 483 (1954)) but has remained stubbornly persistent for the last 30 years. The test score

gap between poor and rich students was also narrowed following passage of the *Elementary and Secondary Education Act* (1965), but in recent years, it too has proven resistant to further shrinkage. Researchers Jencks and Phillips commented on this phenomenon in 1998:

Traditional measures of socioeconomic status account for no more than a third of the test score gap, our results show that a broader index of family environment may explain up to two-thirds of it. Racial differences in grandparents' educational attainment, mothers' household size, mothers' high school quality, mothers' perceived self-efficacy, children's birth weight, and children's household size all seem to be important factors in the gap among young children. Racial differences in parenting practices also appear to be important. (p. 138)

Another report by Peterson and West (2003) linked integration to failure rates on the *No Child Left Behind Act's* standards. The authors stated, "The more integrated a state's schools are, the higher the proportion of schools that are likely to be affected by *NCLB*" (p. 160). Unless schools meet a threshold number of students in the subgroups required by *No Child Left Behind*, they do not have to show adequate yearly progress for the subgroup students. The more integrated schools are, the more subgroups there are that must show adequate yearly progress. Schools with fewer minorities, special education students, and poor students have a much easier time meeting the requirements of *No Child Left Behind*.

According to the Fair & Open Testing Organization (2003b), a Michigan State University report released in July of 2003 provided an important reality check on exactly which schools and communities the federal government will dub as "failing" under the *No Child Left Behind Act* (p. 2). According to the report, nearly all of Michigan's troubled schools were in high-poverty urban areas and served low-income, minority children. The researchers found that only 7 out of the 216 troubled schools were in suburban and rural areas. The researchers reported that David Plank, director of the center, said the percentage of failing schools in urban areas equal to 97 percent in this case "is more dramatic than expected" (p. 2). In addition, an old veteran of educational policy, TheodoreSizer (2004) stated, "The best predictor of a child's educational success always has been and still is the economic and social class of his [or her] family rather than the school that he or she happens to attend"(p. xii).

Several people are becoming more outspoken on the concerns of denying a high school student a diploma. Kilgore (2003), president of the Nashville-based Modern Red School House, commented in an article in the *Tennessean*:

Tests are blunt instruments, not finely calibrated measures of performance. The same student can produce different results on the same test depending on the day. If we allow exit exams alone to make or break a student's chances of acquiring a high school diploma, then we should work to design a fairer system that serves the needs of all students. (p. 1)

Heubert (2002) of Columbia University added:

If students with disabilities and minority students who fail promotion tests are retained in grade, they are at substantially increased risk of dropping out. Students retained in grade even once are much more likely to drop out later than are students not retained, and the effects are even greater for students retained more than once. Some scholars have concluded that retention is the single strongest predictor of which students will drop out of school. Given the relationships between promotion testing, retention in grade, and increased dropout rates, the National Research Council has described simple retention in grade as 'an ineffective intervention. (p. 10)

In 2004, 20 states had mandatory exit exams. Focusing on 16 states with exit exams, researchers from the Center on Education Policy (as cited in Chudowsky & Gayler, 2004) used an archival time series research design to look for changes in dropout rates, high school graduation rates, and enrollment in GED programs after the exit exam was introduced. The researchers concluded that high school exit exams led to higher dropout rates, lower graduation rates, and increased enrollments in GED programs in the majority of states.

In a 2004 article in *Education Week*, Staresina stated:

A student's decision to drop out of school has long-term consequences that can contribute to juvenile delinquency, welfare dependency, or, in the worst cases, prison. According to the national Center for Education Statistics, the population segment of U.S. 16-24 year-olds who were not enrolled in school, or who did not have a high school diploma or a General Education Development credential was about 11% in 2001. In 2000, adults ages 25 to 34 who had dropped out of school or had not acquired a GED, earned up to 30% less than their peers who had completed high school or had GED's. The gap widened when comparing the incomes of high school dropouts with those people with bachelor's degrees. In 2000, male and female college graduates earned \$42,292 and \$32,238, respectively, while male and female high school dropouts earned \$19,225 and \$11,583, respectively. But the value of a high school education cannot be measured in dollars



alone. Rates of high-risk behaviors such as teen pregnancy, delinquency, substance abuse, and crime are significantly higher among dropouts. (pp. 1-2)

The Tennessee Advisory Commission on Intergovernmental Relations (TACIR) (2002) was created by the General Assembly in 1978 to monitor federal, state, and local government relations in Tennessee and to make recommendations for their improvement. In 2002, TACIR noted the following concerning graduation rates in Tennessee:

Tennessee has a lot to overcome when it is compared to other states in education: Only three other states have proportionately fewer adults over 25 years old without high school diplomas; only five states have proportionately fewer adults over 25 years old without college degrees. Adults with less than a high school education earned only half the average amount for all adults. At least 21.4% of Tennesseans fall into this group. There's an old saying: 'It takes money to make money.' That goes double today. It takes money to get a good education, and it takes a good education to make money. Only five other states spend less per student than Tennessee. It will be difficult for Tennessee to attract better paying jobs without improving the overall education level of Tennesseans, and that will be difficult, if not impossible, without investing more in education. (p. 4).

The 20 states that required high school exit exams in 2004 were: Alabama, Alaska, Florida, Georgia, Indiana, Louisiana, Maryland, Massachusetts, Minnesota, Mississippi, Nevada, New Jersey, New Mexico, New York, North Carolina, South Carolina, Tennessee, Texas, and Virginia. The remaining 30 states that do not have exit exams have plans to phase them in by 2009 (Education Commission of the States, 2005b).

Amrein and Berliner (2002) reported that a study by the National Assessment of Educational Progress reported the following conclusions:

The data presented in this study suggested that, after the implementation of high school graduation exams, academic achievement apparently decreases. After high school graduation exams were implemented, achievement as indicated by ACT, SAT, and AP scores declined. According to the study, 67% of the states posted decreases in ACT and SAT performances. The study further indicated that 57% of the states posted decreases in AP performances as compared to the nation after high school. Participation in AP test fell 67% with required high school graduation exams.

Indeed, on balance, these analyses suggest that high-stakes tests and high school graduation exams may tend to inhibit the academic achievement of students, not foster their academic growth. Although test scores on state-administered tests usually increase after high stakes testing policies are implemented, the evidence presented here suggests that in these instances students are learning the content of the state-administered test and

perhaps little else. This learning does not, however, appear to have any meaningful carryover effect. (pp. 57-58)

Tennessee's graduating seniors must pass three mandatory Gateway exit exams and those exams must count at least 15% of the course grade. They must also pass 28 Carnegie units of class credit. There are two paths for earning a regular high school diploma. Both the Technical Path and University Path require a core curriculum of fifteen units: four English, three math, three science, three history, one economics, and one wellness class. University path students must pass the core curriculum, add 2 foreign language credits, 1 visual arts class, and 10 other courses as determined by individual county boards of education. Technical path students must pass the core curriculum, add 4 units from a technical program of study, and 9 electives as determined by individual county boards of education (Tennessee State Board of Education, 2005).

The cool drink of educational water that would sustain life has become a deep pool in which many are drowning. A life preserver was requested for struggling students in the *Education Reform Act* of 2001. It would have included 10 million dollars targeted for student assistance in the first year of Gateway implementation. The "Catching-Up" program would have developed an individual intervention plan. The Commissioner would have provided grants to school systems for students at risk of failing graduation requirements (State Department of Education, 2003, p. 1). The life preserver was never funded and the students were left to sink or swim. Many would make it; some would not.

### *From Classrooms to Court Cases*

The goal of schools is to educate and help students reach their potential to succeed in life. The use of tests should not be an anchor but a lifeline to success. Tennessee may soon join the ranks of other states that have had legal battles because of graduation exit exams. Indiana is currently under legal challenge by advocates for children with disabilities. There, a civil liberties group is seeking an injunction that would permanently exempt children with disabilities from the

requirement that they pass the exam in order to receive a diploma. Texas is also facing a legal challenge over its exit exams. As cited in Kauffman, Maldonado, and Perales (1997), in the U.S. District Court for the Western District of Texas, San Antonio Division, the defense argued:

The TAAS is an invalid instrument for determining which students are qualified to receive diplomas from a Texas public high school. TAAS test have been used to place students into remedial classes. Because of this remedial education, these students have frequently received inferior educations. The cut-off score used to deny otherwise deserving and qualified students the financial, social, and educational opportunities associated with a high school diploma is arbitrary and capricious. There is no or insufficient empirical evidence to support the contention that students who score at or above the cut off score on the TAAS are any more qualified or deserving of a high school diploma than those who score below the cut off score. Many who score below the cut-off score could perform satisfactorily as high school graduates in college, the military, and the workforce. (n.p.)

In the *Crump v. Gilmer Indep. Sch. Dist.*, 797 F. Supp. 552, 555-57 (E.D. Tex. 1992) court case, a temporary restraining order was granted to students on the grounds that the implementation period for Texas Assessment of Academic Skills (TAAS) was insufficient, and that material tested under TAAS was not actually taught in schools; this violated the due process clause (Kauffman et al., 1997).

In the *Debra P. v. Turlington*, 644 F. 2d 397, 404 (5<sup>th</sup> Cir. Unit B 1981), the court declared Florida's law unconstitutional under the due process clause because it did not provide adequate notice for students to pass a statewide minimum competency test in order to receive a diploma, and that the test was fundamentally unfair because it covered material that was not taught in Florida's schools (Heubert, 2002).

According to Loviglio (2004), the Reading School District in Pennsylvania is suing the Department of Education for classifying 13 of its 19 schools as failing to meet academic standards under the federal *No Child Left Behind Act*. Loviglio pointed out, "It's ludicrous to give our Spanish-speaking kids a test in English--a test they cannot understand--and then say that they failed it. It's not fair to the kids and it's not fair to the school district" (p. 2). Togut (2004) gave another example such as the Georgia case of *Anderson v. Banks*, 520 F. Supp. 472, 498-503 (S.D. Ga. (1981)), where the court ruled the school district's exit exam policy violated the Equal

Protection Clause of the 14th Amendment. In the case of *Graves v. Alabama State Bd. Of Educ.*, 776 F. Supp. 1518, 1523 (M.D. Ala. 1991), the court found that redress was available under Title VI for “actions having an unjustifiable disparate impact on minorities” (Togut, p. 3).

In New York when 65% of the seniors failed the Math A Regents exam, the state testing director resigned and State Education Commissioner Richard Mills allowed seniors to graduate who completed all other requirements except the Math A test. Steven Sanders (D-Manhattan) from New York and chairman of the Education Committee in the State Assembly said he and his state Senate counterpart intended to hold hearings about high-stakes assessment in the late summer of 2003 to give the public a chance to "air their views on the state's educational policies" (National Center for Fair & Open Testing, 2003, p. 1). The courts have ruled that a high school diploma is a property interest and protected by the 14th Amendment. Implementing exit exams is likely to present states with many legal challenges (Parkes & Stevens, 2003).

In 1999, Congress mandated the National Research Council to study appropriate and sound testing policy. According to Heubert (2002), the council's report stated:

Graduation tests should cover only the content and skills that students have had an opportunity to learn. Tests should be used for high stakes decisions only after schools have implemented changes in teaching and curriculum; and in elementary or secondary education, a decision or characterization that will have a major impact on a test taker should not automatically be made on the basis of a single test score. Other relevant information should be taken into account if it will enhance the overall validity of the decision. (p. 14)

In addition, Heubert wrote that the National Research Council recommended that tests should be closely aligned with curriculums, that instructional changes should be implemented before tests are used to make high-stakes decisions, and that other relevant information should be considered before making high-stakes decisions. Tennessee's Department of Education, along with several other states, must consider all other information irrelevant in assessing students' readiness to graduate or they are ignoring a recommendation by the National Research Council. In 2005, there is no alternative to making the cut-scores on Tennessee's three Gateway exams.

In 1999, the American Educational Research Association (2004) in conjunction with the American Psychological Association and the National Council on Measurement in Education published *The Standards for Educational and Psychological Testing*. The book is generally referred to as *The Standards* and is considered the central reference work of sound testing practices. According to the American Educational Research Association:

There is no sharp difference between those just below the cut point and those just above it, and the use of the cut score does not entail any criterion-referenced interpretation. This is subject to legal requirements with respect to the nature of the validity and reliability evidence needed to support the use of rank-order selections and the unavailability of effective alternative selections methods, if it has a disproportionate effect on one or more subgroups. (p. 53)

*The Standards* made a valid point, in that there is no sharp difference between students who barely pass a Gateway exam and students who barely fail. The difference could be as small as one correct answer. Future court cases in Tennessee might examine the reliability and validity evidence for granting or denying diplomas based upon a one-question difference. The authors of *The Standards* also discussed the process of placing cut points in standardized tests that determine the pass/fail threshold. They stated:

Cut-scores embody value judgments as well as technical and empirical considerations. Where the results of the standard-setting process have highly significant consequences, and especially where large numbers of examinees are involved, those responsible for establishing cut-scores should be concerned that the process by which cut-scores are determined be clearly documented and defensible. (p. 54)

The cut-scores for Tennessee's Gateway exams have significant consequences and involve large numbers of students.

Standard number 7.10 addressed the issue of subgroups and construct under representation and construct-irrelevant variance. The American Education Research Association (2004) described construct under representation as:

The extent to which a test fails to capture important aspects of the construct the test is intended to measure. Construct irrelevance is the extent to which test scores are influenced by factors that are irrelevant to the construct that the test is intended to measure." Standard number 7.10 states, When the use of a test results in outcomes that affect the life chances or educational opportunities of examinees, evidence of mean test

score differences between relevant subgroups of examinees should, where feasible, be examined for subgroups for which credible research reports mean differences for similar tests. Where mean differences are found, an investigation should be undertaken to determine that such differences are not attributable to a source of construct under representation or construct-irrelevant variance. While initially the responsibility of the test developer, the test user bears responsibility for uses with groups other than those specified by the developer. (p. 83)

The standard recommends research examining the mean difference in test scores among subgroups such as minorities or the economically disadvantaged. If differences exist, the standard points out that ultimate responsibility for determining that the test does not miss important aspects of competence, or measurement factors outside the test construct, is borne by the test user (American Education Research Association, 2004). The burden of proof that Gateway exams do not miss important aspects of competency and are not significantly impacted by factors extraneous to knowledge of the subject matter is borne by the State Department of Education. In many states that have implemented exit exams, courts have examined the proof.

According to the American Education Research Association (2004), Standard number 13.5 addressed:

When test results substantially contribute to making decisions about student promotion or graduation, there should be evidence that the test adequately covers only the specific or generalized content and skills that students have had an opportunity to learn. Court cases in other states have hinged on this standard. State departments, school districts, and schools must prove that their students have had the opportunity to learn the subject matter. (p. 146)

Standard 13.5 was related to making sure the curriculums and tests were aligned and that the test was not affected by extraneous factors. Schools that received low marks by *No Child Left Behind* might find it difficult to prove that their students had ample opportunity to learn the subject material (Alliance for Excellent Education, 2003).

Tennessee's use of Gateway exams as litmus tests for diplomas is in clear violation of standard 13.7 that, according to the American Education Research Association (2004) stated:

In educational settings, a decision or characterization that will have major impact on a student should not be made on the basis of a single test score. Other relevant information

should be taken into account if it will enhance the overall validity of the decision. (p. 146)

Withholding a high school diploma has a major impact on the lives of students. Standard number 13.1 from *The Standards for Educational and Psychological Testing* (American Education Research Association) stated:

When educational testing programs are mandated by school, district, state, or other authorities, the ways in which test results are intended to be used should be clearly described. It is the responsibility of those who mandate the use of tests to monitor their impact and to identify and minimize potential negative consequences. Consequences resulting from the uses of the test, both intended and unintended, should also be examined by the test user. (p. 145)

Because the graduating class of 2005 was the first cohort who had to meet the Gateway requirements, few data were available relative to the consequences of withholding diplomas. As data become available, they should be closely examined to monitor the impact of the new graduation requirements.

The *No Child Left Behind* act required state departments to report student progress in two content areas, math and reading/language plus writing. The progress was reported as the percentage of students scoring below proficient, proficient, and advanced in the two content areas. The progress also had to be disaggregated into nine subcategories: all students, White, Hispanic, African American, Native American, Asian/Pacific Islander, economically disadvantaged, students with disabilities, and limited English proficient. Tennessee used the percentages from Gateway Algebra to satisfy the math-reporting requirement of *NCLB* and the percentages from Gateway English to satisfy the reading/language plus writing-reporting requirement of *NCLB*. The Tennessee Department of Education (2004b) reported, as shown in Table 3, the pass/fail rates for last year's Gateway Algebra test disaggregated into the nine subgroups required by *NCLB*.

Table 3

*Pass/Fail Rate on 2004 Gateway Algebra Exam Disaggregated Into 9 Subgroups*

2004	% Below proficient	% Proficient or Advanced
All Students	19	81
Caucasian	13	87
Hispanic	25	75
African American	39	58
Native American	20	78
Asian/Pacific Islander	9	88
Economically Disadvantaged	33	66
Students with Disabilities	38	40
Limited English Proficiency	62	62

Obviously there was a mistake in the State Report Card concerning Limited English Proficiency as 62% of those students could not simultaneously pass and fail the Algebra exam. The students with disabilities percentages added up to 78%, which left out 22% of these students. The African American and Asian/Pacific Islander percentages left out 3%. In only three categories did the percentages add up to 100%. This casts clouds of dubiety over this section of the State Report Card. If credence can be lent to these numbers, then a third or more of African Americans, those who were economically disadvantaged, and students with disabilities failed the Gateway Algebra test.

Tennessee met the reporting requirement of *No Child Left Behind* in reading/language plus writing as stated by the Tennessee Department of Education (2004b) by reporting, as shown in Table 4, the pass/fail rates for the Gateway English test in 2004.



Table 4

*Pass/Fail Rate on 2004 Gateway English II Exam Disaggregated Into 9 Subgroups*

2004	% Below Proficient	% Proficient or Advanced
All Students	10	90
Caucasian	7	93
Hispanic	16	84
African American	17	83
Native American	15	85
Asian/Pacific Islander	8	92
Economically Disadvantaged	18	82
Students with Disabilities	44	56
Limited English Proficiency	37	63

Unlike the math subgroups, all of the percentages add up to 100% in the English subgroups. The failure rates are much lower for the Gateway English exam than for the Gateway Algebra exam except for students with disabilities. The Gateway Biology Test was listed as 4% below proficient, 96 % proficient and above, with no subgroups listed (Tennessee Department of Education, 2004a). *No Child Left Behind* does not require a disaggregated listing for science.

*Alternatives to High-Stakes Testing*

All states under the *No Child Left Behind Act* are required to test students to receive federal aid for disadvantaged students, but not all states choose to deny diplomas based on the cut-off scores of exit exams. According to the Fair & Open Testing Organization (2003a):

Rhode Island approved new graduation requirements that do not rely solely on standardized test scores. To graduate, students entering ninth grade in September 2004 shall exhibit proficiency in a common academic core curriculum that includes the arts and technology. This proficiency must be demonstrated through at least two of the following: departmental end of course exams, a Certificate of Initial Mastery, portfolios, capstone projects, public exhibitions, and use of technological tools. Schools may choose

to use the state assessment test, but it must not count for over 10% of a student's score contributing to graduation. (p. 1)

Maryland, after four separate delays, targeted the graduating class of 2009. Maryland proposed that cut-scores be used and averaged. In the minutes of the Maryland State Board of Education of June 15, 2004, the board chairperson made announcement, saying, "Students must achieve the combined score established by the State Board. The combined score proposed is equal to the total of the four passing scale scores presently adopted by the Board" (p. 1).

California has recently moved an exit exam score requirement from 2004 to 2006 after a study projected that about 20% of its high school seniors would be denied diplomas. According to Bowden (2004), Reed Hastings, president of the California State Board, said the prospect of one fifth of the state's seniors not graduating was neither politically nor legally acceptable. Nevada temporarily lowered cut-scores in math from 304 to 290 after only 36% of students passed the math test. New York students who failed the math portion (65%) were allowed to graduate anyway if they met all other requirements. Approximately 250 parents, students, teachers, and legislators gathered in Rochester, New York asking for an investigation into the testing and calling for State Education Commissioner Richard Mill's resignation. Mills announced that the Math A Regents exam was unfair and that districts would be able to use class grades to determine whether seniors could graduate with regular diplomas (Bowden). All states allow for retesting, and some, numerous times. Some states allow for alternatives for the state's exit exam.

North Carolina allows for the test to be retaken 13 times; Minnesota 11; Virginia 9; Florida and Texas 5; Alabama, Georgia, Indiana, Massachusetts, Ohio, South Carolina, and Utah 4 times; Mississippi, New York and Tennessee 3 times; and Alaska, New Jersey, and New Mexico 2 times. New York and Tennessee require students to attend remedial classes. Florida, New York, and Virginia seniors who have failed the exit exam can substitute scores from: Advanced Placement test, SAT, ACT, International certificate of Education, or the Cambridge International Examination. Indiana, Massachusetts, Georgia, Ohio, Mississippi, and New

Mexico have waiver or appeals processes where students can still receive a regular diploma even though they did not pass the exit exam (Bowden, 2004). According to Bowden, an alternate route usually requires that the student:

1. participates in all retake opportunities;
2. completes remediation opportunities provided by the school;
3. maintains at least a C average in courses required for graduation; and
4. obtains a written recommendation from a teacher in each subject area in which the student did not receive a passing score on the graduation exam. (p. 21)

According to Bowden, the recommendation often must have: the principal's concurrence and be supported by documentation that the student has attained the academic standard in the subject area based upon classroom work or tests other than the graduation exam.

Other states' experiences with exit exams should provide valuable insight into Tennessee's 2005 exit exam requirements. Analysis of the impact of these 2005 requirements on poor and minority students is crucial to decisions concerning the placement of cut-scores and remediation opportunities.

## CHAPTER 3

### RESEARCH METHODOLOGY

The purpose of this study was to examine the variables that are associated with the percentage of students who pass Tennessee's Gateway exams in high school. Associations were examined between the Gateway exams and variables including: socioeconomic status, ethnicity, dropout rate, graduation rate, attendance, average daily membership, per-pupil expenditure, teacher salary, and elementary-school reading scores. Chapter 3 presents the research methodology including methods of data collection and gives an overview of the research questions and corresponding null hypotheses.

#### *Data Collection*

The 2004 Tennessee Schools Report Card contains information aggregated at the state, district, and school level. The school-level report cards list data for each school, including: ethnic makeup, percentage qualifying for free/reduced-price meals, ADM, attendance and promotion rates, the percentage passing each of the Gateway exams, norm and criterion referenced test results disaggregated into nine subgroups as mandated by *No Child Left Behind*, plus Value-Added gain scores in four subjects: math, science, language arts, and reading. For this study, data were received for 1,677 schools in three Excel files from the head of the accountability division for the State Department of Education. One file contained demographics, one file contained test score data excluding Value-Added, and one file contained the Value-Added test results. The three files were imported into the Statistical Package for the Social Sciences (SPSS), ranked by school ID number, and eventually merged into one data set. After eliminating schools that did not report the percentage of students passing Gateway exams and

other data crucial to analysis, a population study was assembled containing 281 schools representing over 90% of the schools that administered Gateway exams in Tennessee.

### *Research Questions*

#### *Research Question 1*

What are the mean and standard deviation of the percentage of students passing each of Tennessee's Gateway exams?

The means and standard deviations of the percentage passing each of the three Gateway exams were calculated for the year 2004 and for the two-year average of 2003-2004. The percentages of students scoring proficient and advanced on the Gateway exams in 2003 were also calculated. The percentages scoring proficient and advanced in Gateway Algebra and Gateway Biology I in 2002 were also calculated in order to determine the stability of the percentages from year to year.

#### *Research Question 2*

What school characteristics are most strongly associated with the percentage of students passing each of the three Gateway exams?

The percentages passing each Gateway exam were checked for associations with school demographics including the percentage of students qualifying for free/reduced-price meals, the percentage of Caucasian students attending each school, the dropout rate, graduation rate, attendance rate, per-pupil expenditure, and teacher salaries. Associations were examined by calculating the Pearson correlation between each demographic variable and the percentage passing each of the Gateway exams. Tables were produced showing the Pearson  $r$  values between the school demographic data and each of the three Gateway exams. The significant values were checked in order to reject or fail to reject null hypothesis number one that stated, "There is no association between the percentage of students passing Gateway exams and

socioeconomic status, ethnicity, dropout rate, graduation rate, attendance, average daily membership, per-pupil expenditure, teacher salary, and elementary reading scores.

Fifty-four schools that reported Gateway results also reported elementary school data because of their grade configuration. Pearson correlation values were calculated between the percentage of students passing each of the Gateway exams and the percentage of students scoring advanced in reading for these 54 schools. The significant value was examined in order to reject or fail to reject that portion of null hypothesis number one.

Seventeen schools that reported Gateway results also reported elementary school data concerning African American students because of their grade configuration and ethnic makeup. Pearson correlation values were calculated between the percentage of students passing each of the Gateway exams and the percentage of African American students scoring advanced in reading for these seventeen schools. The significant value was examined in order to either reject or fail to reject that portion of null hypothesis number one.

All correlation values were examined and ranked according to the strength of the association. The correlation values among demographics and each of the three Gateway exams were examined in order to determine which demographic variables were most strongly associated with which Gateway exam.

The schools were divided into quartiles based upon the percentage of Caucasian students attending each high school in order to explore the different Pearson correlation values between per-pupil expenditure and Gateway exam pass rates for each of the quartiles. The Pearson correlation values were also calculated between teacher salaries and Gateway pass rates for the quartiles based upon the percentage of Caucasian students. The values are listed in Table 9.

The schools were also divided into quartiles based upon the percentage of students qualifying for free/reduced meals in order to explore the different Pearson correlation values between per-pupil expenditure and Gateway exam pass rates for each of the quartiles. The Pearson correlation values were also calculated between teacher salaries and Gateway pass rates

for the quartiles based upon the percentage of students qualifying for free/reduced meals. The values are listed in a table 9. The significant values were checked in order to reject or fail to reject that portion of null hypothesis number one.

### *Research Question 3*

What combination of school characteristics yields the highest predictive value of the percentage of students passing the three Gateway exams? A collection of the highest associating characteristics was used as predictor variables in multivariable linear regressions. Different combinations of predictor variables were tried with each of the three Gateway exams, and the combination that yielded the highest coefficient of determination was used to answer research question number three.

### *Research Question 4*

What types of schools have the largest percentages of their students fail the Gateway exams?

Based upon the strong association between the percentage of students who qualified for free/reduced meals and the percentage passing the Gateway exams, schools were divided into quartiles based upon the percentage of students who qualified for free/reduced meals. The percentage of students who qualified for free/reduced meals was calculated for each quartile and the pass rate for each quartile was calculated for all three Gateway exams.

### *Hypotheses*

Ho1: There is no association between the percentage of students passing Gateway exams and socioeconomic status, ethnicity, dropout rate, graduation rate, attendance, average daily membership, per-pupil expenditure, teacher salary, and elementary reading scores.

Ho2: There is no difference in the percentage passing Gateway exams among schools with a high percentage of students who qualify for free/reduced-price meals and schools with a low percentage of students who qualify for free/reduced-price meals.

Ho3: There is no difference in the percentage passing Gateway exams between schools serving predominantly Caucasian students and schools serving a high percentage of minority students.

Tables were produced showing the Pearson  $r$  values between the schools' demographic data and each of the three Gateway exams. The significant values were checked in order to retain or reject null hypothesis #1

For null hypothesis #2, an independent samples  $t$  test was performed between quartile I and quartile IV to determine if the average pass rate was significantly different between the top and bottom quartiles that were based upon the percentage of students who qualified for free/reduced meals.

Because of the strong association between the percentage of Caucasian students and the percentage passing the Gateway exams, schools were divided into quartiles based upon the percentage of Caucasian students. The percentage of Caucasian students was calculated for each quartile and the pass rate for each quartile was calculated for all three Gateway exams.

For null hypothesis #3, an independent samples  $t$  test was performed between quartile I and quartile IV to determine if the average pass rate was significantly different between the top and bottom quartiles that were based upon the percentage of Caucasian students attending high schools.

Because the quartiles containing the most students who qualified for free/reduced-price meals and the most minorities had the lowest pass rates on the Gateway exams, they were combined using the cut point criteria for their respective quartiles. Twenty-four schools met the criteria of having over 84.4% of their students who qualified for free/reduced-price meals, and having over 94% minority students. Their pass rates on all three Gateway exams were calculated



and the results helped answer research question four that addressed: “What types of schools have the largest percentages of their students fail the Gateway exams?”

CHAPTER 4  
ANALYSIS OF DATA

The analysis of data concentrates on which school characteristics are most strongly associated with the percentage of students passing Tennessee’s Gateway exams and what combination of school characteristics yields the highest predictive value of the percentage of students passing the Gateway exams. Schools were also divided into quartiles based upon the percentage of students who qualified for free/reduced-price meals and ethnicity in order to examine the differences in the percentage of students passing the Gateway exams among the quartiles.

*Research Question 1*

What are the mean and standard deviation of the percentage of students passing each of Tennessee’s Gateway exams in 276 Tennessee high schools?

Table 5 lists the mean and standard deviation for the percentage of students passing the three Gateway exams in 276 Tennessee high schools in 2004. The number of high schools represented include over 90% of the high schools in Tennessee.

Table 5

*Percentage of Students Passing Tennessee’s Three Gateway Exams in 276, 280, and 281 Tennessee high schools*

	<i>N</i>	<i>M</i>	<i>SD</i>
% Proficient & Advanced Algebra I 2004	276	80.46	13.71
% Proficient & Advanced Biology 2004	280	95.57	4.53
% Proficient & Advanced English II 2004	281	90.67	6.07

The mean percentage of students passing the Gateway Algebra exam indicated that 19.54% failed the exam. The mean percentage of students passing Algebra I indicated that it was more difficult for students to pass than Biology I or English II. Much of the difference in the percentage of students passing the Gateway exams might be attributed to the fact that students were required to answer 30 questions correctly in Algebra I, 27 in English II, and only 20 questions correctly in Biology I. The standard deviation of the Algebra I percentage is over three times the standard deviation of the Biology I percentage and over twice the standard deviation of the English II percentage. Therefore, the percentage of students passing the Algebra I Gateway exam is spread over a much wider area, indicating greater variability.

The Tennessee Schools Report Card (2004) also listed the two-year average of the percentage of students passing the Gateway exams for each high school. Table 6 lists the mean and standard deviation for the two-year average percentage of students passing the three Gateway exams.

Table 6

*Percentage of Students Passing Tennessee’s Three Gateway Exams 2003-2004 (2-Year Average) at 274, 277, and 278 Tennessee High Schools*

	<i>N</i>	<i>M</i>	<i>SD</i>
% Proficient & Advanced Algebra I 03-04 2 yr. avg.	274	79.24	14.30
% Proficient & Advanced Biology I 03-04 2 yr. avg.	278	95.27	4.92
% Proficient & Advanced English II 03-04 2 yr. avg.	277	90.19	5.72

There is very little difference in the means and standard deviations between the 2004 percentages and the 2003-2004 two-year average percentages. This indicates that perhaps the pass rates are stable.

In the 2004 Report Card, the State Department of Education began combining the percentage of students scoring proficient on the Gateway exams with the percentage of students scoring advanced. In the 2003 Report Card, the state listed the percentages separately. Thirty correct answers were required to score proficient in Algebra I, whereas 42 questions were required to score advanced. In English II, 27 correct answers equaled proficient and 41 equaled advanced. In Biology I, 20 correct answers earned proficient with 36 correct answers scoring advanced. Table 7 shows the percentages of students scoring proficient and advanced for each of the three Gateway exams in 2003.

Table 7

*Percentage of Students Scoring Proficient and Advanced on the Three Gateway Exams in 2003 at 279 or 280 Tennessee High Schools*

Student Percentages	<i>N</i>	<i>M</i>
% Proficient Algebra I 2003	280	32.76
% Advanced Algebra I 2003	280	42.94
% Proficient Biology I 2003	280	37.23
% Advanced Biology I 2003	280	57.30
% Proficient English II 2003	279	37.11
% Advanced English II 2003	279	49.66

A larger percentage of students scored advanced on all three Gateway exams than did those who scored proficient. In 2003, the Biology I result indicated that more than half of the students scored advanced, and almost half of the students scored advanced in English II.

Showing the same percentages for 2002 will help determine whether these percentages remain stable. Table 8 portrays the percentages scoring proficient and advanced in Algebra I and Biology I in 2002. The 2004 state Report Card does not give the percentages for English II in 2002.

Table 8

*Percentage of Students Scoring Proficient and Advanced in Algebra I and Biology I in 2002 at 279 or 280 Tennessee High Schools*

Student Percentage Scores	<i>N</i>	<i>M</i>
% Proficient Algebra I 2002	280	31.05
% Advanced Algebra I 2002	280	44.82
% Proficient Biology 2002	279	40.28
% Advanced Biology 2002	279	54.19

A comparison of the percentage of proficient and advanced in Algebra I and Biology I between the years 2002 and 2003 shows that the percentages remain fairly stable. The Algebra I percentages vary approximately 3% and the Biology I percentages vary approximately 2%.

*Research Question 2*

What school characteristics are most strongly associated with the percentage of students passing each of the three Gateway exams?

In order to answer this question, Pearson correlation values were calculated between each Gateway exam and school demographic data. The demographic data included: the percentage of students qualifying for free/reduced-price meals, the percentage of Caucasian students, the dropout rate, the graduation rate, the attendance rate, the average daily membership, per-pupil expenditures, and teacher salaries. All demographic data are school-level data contained in the 2004 Report Card with the exceptions of per-pupil expenditure and teacher salaries; these are district-level data obtained from the Tennessee Education Association. Table 9 lists the correlation values between the demographic data and the percentage of students passing the Gateway Algebra exam in 2004.

Table 9

*Pearson Correlation Values Between Percentage of Students Passing the Gateway Algebra Exam in 2004 at Each High School and School Demographic Data from Each High School*

Demographic Variables	N	Pearson Correlation With % Proficient & Advanced Algebra I 2004
% of Students qualifying Free/Reduced Meals	276	-.631(**)
% of Caucasian Students	276	.662(**)
Cohort Dropout Rate 2004	269	-.604(**)
Graduation Rate 2004	276	.669(**)
Attendance Rate Grades 9-12 in 2004	275	.621(**)
Average Daily Membership	276	.081
Per Pupil Expenditure 2002-03 (District Level Data)	274	-.446(**)
Teacher Salary Bachelor's Degree (Top Step) 2003-04 (District Level Data)	182	-.357(**)

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

Graduation rate, attendance rate, and the percentage of Caucasian students had positive correlations stronger than .6. Both dropout rate and the percentage of students qualifying for free/reduced-price meals had correlations stronger than negative .6. The negative correlations for per-pupil spending and teacher salaries are somewhat surprising and will be explored after showing the correlation values between school demographics and the Gateway exams of Biology I and English II. Table 10 lists the Pearson correlation values between the percentage of students passing the Gateway biology exam in 2004 and school demographic data.

Table 10

*Pearson Correlation Values Between Percentage of Students Passing the Gateway Biology I Exam in 2004 at Each High School and School Demographic Data from Each High School*

Demographic Variables	N	Pearson Correlation With % Proficient & Advanced Biology I 2004
% Students qualifying Free/Reduced Meals	280	-.501(**)
% Caucasian Students	280	.571(**)
Cohort Dropout Rate 2004	273	-.580(**)
Graduation Rate 2004	280	.566(**)
Attendance Rate Grades 9-12 in 2004	279	.511(**)
Average Daily Membership	280	.034
Per Pupil Expenditure 2002-03 (District Level Data)	279	-.337(**)
Teacher Salary Bachelor's Degree (Top Step) 2003-04 (District Level Data)	182	-.346(**)

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

The Pearson correlation values between school demographic data and Biology I and Algebra I are similar, although the Biology I correlation values are somewhat weaker. Graduation rate, attendance rate, and the percentage of Caucasian students had positive correlations stronger than .5. Both dropout rate and the percentage of students qualifying for free/reduced-price meals had correlations stronger than negative .5. As in the Algebra I correlation table, average daily membership showed very weak correlation with the percentage of students passing Gateway biology.

Table 11 lists the Pearson correlation values between the percentage of students passing the Gateway English II exam in 2004 and school demographic data.

Table 11

*Pearson Correlation Values Between Percentage of Students Passing the Gateway English Exam in 2004 at Each High School and School Demographic Data from Each High School*

School Demographic Variables	N	Pearson Correlation With % Proficient & Advanced English II 2004
% Students qualifying Free/Reduced Meals	281	-.616(**)
% Caucasian Students	281	.591(**)
Cohort Dropout Rate 2004	274	-.659(**)
Graduation Rate 2004	281	.720(**)
Attendance Rate Grades 9-12 in 2004	280	.681(**)
Average Daily Membership	281	.049
Per Pupil Expenditure 2002-03 (District Level Data)	279	-.334(**)
Teacher Salary Bachelor's Degree (Top Step) 2003-04 (District Level Data)	182	-.303(**)

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



The graduation rate was the only school characteristic correlated above .7 with the Gateway English II pass rate. The correlation values were very similar for English and for Algebra I pass rates with school demographic data. The percentage of Caucasian students was 7% more positively correlated with Algebra I scores than with English II scores.

For all three Gateway exams, per-pupil expenditure and teacher salaries were negatively correlated with pass rates. These negative values imply that the more money spent on teachers and pupils, the fewer students who pass the Gateway exams. However, high schools located in large metropolitan areas, such as Memphis or Nashville, have high percentages of minority students and spend more on their pupils and teachers. Dividing the schools by quartiles, based upon the percentage of Caucasian students, and then looking at the different correlation values among quartiles between Gateway exams and per-pupil spending and teacher salaries will determine the effect minorities have on those correlation values. Table 12 shows the correlation values between the percentage of students passing the three Gateway exams and per-pupil spending and teacher salaries for four quartiles based upon the percentage of Caucasian students attending each high school.

Table 12

*Pearson Correlation Values Between the Percentage of Students Passing Each of the Three Gateway Exams at Each High School in the Quartile and Per-Pupil Expenditure and Teacher Salary for Each High School in the Quartile. (Quartiles Based Upon the Percentage of Caucasian Students)*

	N	Pearson Correlation With % Proficient & Advanced Algebra I 2004	Pearson Correlation With % Proficient & Advanced Biology I 2004	Pearson Correlation With % Proficient & Advanced English II 2004
<u>Quartile I</u>				
<u>98.6% Caucasian Students:</u>				
Per-Pupil Expenditure 2002-03 (District Level Data)	70	-.058	-.004	-.168
Teacher Salary Bachelor's Degree (Top Step) 2003-2004 (District Level Data)	70	.213	-.009	.093
<u>Quartile II</u>				
<u>94.4% Caucasian Students:</u>				
Per-Pupil Expenditure 2002-03 (District Level Data)	69	.232	.189	.348(**)
Teacher Salary Bachelor's Degree (Top Step) 2003-2004 (District Level Data)	69	.325(**)	.052	.297(*)

Table 12 (continued)

	N	Pearson Correlation With % Proficient & Advanced Algebra I 2004	Pearson Correlation With % Proficient & Advanced Biology 2004	Pearson Correlation With % Proficient & Advanced English II 2004
<u>Quartile III</u>				
<u>81.4% Caucasian</u>				
<u>Students:</u>				
Per-Pupil Expenditure 2002-03 (District Level Data)	71	-.066	.050	.222
Teacher Salary Bachelor's Degree (Top Step) 2003-2004 (District Level Data)	70	.143	.166	.326(**)
<u>Quartile IV</u>				
<u>28.5% Caucasian</u>				
<u>Students:</u>				
Per-Pupil Expenditure 2002-03 (District Level Data)	69	-.481(**)	-.343(**)	-.344(**)
Teacher Salary Bachelor's Degree (Top Step) 2003-2004 (District Level Data)	69	-.322(**)	-.329(**)	-.297(**)

\* Correlation is significant at the 0.05 level (2-tailed)

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

Per-pupil expenditure was correlated significantly positive with the percentage of students passing the English II Gateway exam in quartile II. Teacher salary was correlated significantly positive with the percentage of students passing the Algebra I Gateway exam in quartile II and significantly positive with the percentage of students passing the English Gateway exam in both quartiles II and III. Per-pupil expenditure and teacher salary were both correlated

significantly negative with all three Gateway exams in quartile IV, containing the most minority students. An unqualified answer to the effects of spending on pupils or teachers and results on Gateway exams cannot be given.

The 281 schools in this data set serve a variety of grades. The number of schools and their grade configuration are shown in Table 13.

Table 13

*Grade Configuration of Schools*

Grade Configuration	Number of Schools
K-12	19
5-12	2
6-12	12
7-12	22
8-12	1
9-12	222
10-12	3

The vast majority of schools serving secondary students are configured as 9-12 schools. However, there are 56 schools that contain secondary as well as elementary students. Of these 56 schools, 54 of them reported the percentage of their students in elementary school who scored advanced in reading, and 18 schools reported the percentage of their African American elementary students who scored advanced in reading. These percentages are correlated with the percentages passing the Gateway exams as shown in Table 14.

Table 14

*Pearson Correlation Values Between the Percentage of High-School Students Passing the Three Gateway Exams at Each High School and the Overall Percentage of Students in Elementary School and African-American Students in Elementary School Who Scored Advanced in Reading*

	N	Pearson Correlation With % Proficient & Advanced Algebra I 2004	Pearson Correlation With % Proficient & Advanced Biology I 2004	Pearson Correlation With % Proficient & Advanced English II 2004
Percentage of Students Scoring Advanced in Reading 2003 Elementary School				
% of African American Students scoring Advanced in Reading 2003 Elementary School	18	.595(**)	.668(**)	.596(**)
% of Students in entire school scoring Advanced in Reading 2003 Elementary School	54	.573(**)	.519(**)	.565(**)

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

The percentage of elementary school students, whether they were Caucasian or African American, who scored advanced in reading correlated significantly with the percentages of high-school students passing the Gateway exams. The associations between reading competency in elementary school and Gateway pass/fail rates verified the research that emphasizes the importance of early intervention. The 2004 report by the State Comptrollers Office entitled *Tennessee’s Graduation Exams: Past, Present, and Future* said, “Early Gateway intervention programs could identify students struggling with foundational concepts necessary for Gateway exam success far before a student actually takes the exam” (Morgan et al., 2004, p. 41).

Research question 2 addressed, What school characteristics are most strongly associated with the percentage of students passing each of the three Gateway exams? The highest

correlation value was .720 between the graduation rate and the percentage of students passing the Gateway English exam. Graduation rate was also strongly associated with the percentage of students passing the Gateway Algebra exam, with a Pearson correlation value of .669. The dropout rates were significant in their negative correlation with the percentages passing the Gateway exams, as was the percentage of students qualifying for free/reduced meals. The percentage of Caucasian students and the attendance rates were significant in their positive correlation with the percentages of students passing the Gateway exams. Overall, graduation rates and the percentage of Caucasian students were most positively associated with the percentages passing the Gateway exams. Dropout rates and the percentage of students qualifying for free/reduced meals were the most negatively associated with the percentages passing the Gateway exams. In addition, in those schools that also served elementary pupils, the percentages of elementary students who scored advanced in reading associated positively with the percentages passing the Gateway exams.

Null hypothesis #1:

Ho1: There is no association between the percentage of students passing Gateway exams and socioeconomic status, ethnicity, dropout rate, graduation rate, attendance, average daily membership, per-pupil expenditure, teacher salary, and elementary reading scores.

The significant value or  $p$  value for all the correlations was below an alpha of .01 except average daily membership, per-pupil expenditure, and teacher salary. For socioeconomic status, ethnicity, dropout rate, graduation rate, attendance, and elementary reading scores, the null hypothesis must be rejected. The association is significant. The  $p$  value for average daily membership is greater than .05 in relation to all three Gateway exams, therefore I fail to reject the null hypothesis. There is no association between the size of a school and the percentages passing the Gateway exams. For per-pupil expenditure and teacher salary, the  $p$  values vary by quartiles based upon ethnicity; in some quartiles, the association is significant and in others, it is not.

*Research Question 3*

What combination of school characteristics yields the highest predictive value of the percentage of students passing the three Gateway exams?

The school characteristics with the highest Pearson correlation values with the percentage passing the Gateway Algebra test were: graduation rate, percentage of Caucasian students, and percentage of students qualifying for free/reduced-price meals. Using these three characteristics as predictor variables and the percentage passing the Algebra Gateway exam as the dependent variable yielded the following results as shown in Table 15.

Table 15

*Linear Regression With the Percentage of Students Passing the Gateway Algebra Exam as the Dependent Variable and Graduation Rate, Percentage of Students Qualifying for Free/Reduced Meals, and Percentage of Caucasian Students as the Predictor Variables.*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.768(a)	.590	.586	8.824

a Predictors: (Constant), Graduation Rate 2004, % of Students qualifying Free/Reduced Meals, % of Caucasian Students

Dependent Variable: % of students scoring proficient or advanced in Algebra I 2004

The regression was for 275 high schools instead of 281 because 6 high schools had missing data. The  $R^2$  value of .590 was moderately strong. Results using the same predictor variables but changing the dependent variable to the percentage of students passing the Gateway Biology I exam are presented in Table 16.

Table 16

*Linear Regression With the Percentage of Students Passing the Gateway Biology I Exam as the Dependent Variable and Graduation Rate, Percentage of Students Qualifying for Free/Reduced Meals, and Percentage of Caucasian Students as the Predictor Variables.*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.645(a)	.416	.410	3.476

a Predictors: (Constant), Graduation Rate 2004, % of Students qualifying Free/Reduced Meals, % of Caucasian Students

Dependent Variable: % of students scoring proficient or advanced in Biology I 2004

The predictor variables produced a  $R^2$  value weaker than for Algebra I. Perhaps the lower cut-scores for Gateway Biology I made it less sensitive to variation in school characteristics. Results using the same predictor variables but changing the dependent variable to the percentage passing the English Gateway exam are presented in Table 17.

Table 17

*Linear Regression With the Percentage of Students Passing the Gateway English Exam as the Dependent Variable and Graduation Rate, Percentage of Students Qualifying for Free/Reduced Meals, and Percentage of Caucasian Students as the Predictor Variables.*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.764(a)	.584	.579	3.938

a Predictors: (Constant), Graduation Rate 2004, % of Students qualifying Free/Reduced Meals, % of Caucasian Students

Dependent Variable: % of students scoring proficient or advanced in English II 2004



Using Algebra I as the dependent variable produced the highest  $R^2$  value of .590, followed by English II with .584, and Biology I with .416. The three  $R^2$  values indicate that graduation rate, the percentage of students qualifying for free/reduced meals, and the percentage of Caucasian students can account for about half of the variability in the percentages of students passing Gateway exams.

Adding the percentage of elementary students who scored advanced in reading to the predictor variable list produced higher  $R^2$  values, but it lowered the sample size. Because of the grade configuration of schools, only 54 schools that reported the Gateway percentages also reported elementary school data. Adding the percentage of students in elementary school who scored advanced in reading to the predictor variables used in the preceding regressions raised the  $R^2$  value for Algebra from .590 to .642. Seventeen schools reported Gateway pass/fail rates and the percentage of elementary African American students who scored advanced in reading in 2003. Adding that percentage to the multivariable linear regression produced an  $R^2$  value with algebra pass/fail rates of .773.

Research Question #3 addressed, What combination of school characteristics yields the highest predictive value of the percentage of students passing the three Gateway exams? The combination of high school characteristics that yielded the highest predictive value was: graduation rate, the percentage of students who qualify for free/reduced meals, and the percentage of Caucasian students. For schools that also reported elementary school characteristics, the percentage of students who scored advanced in reading in 2003 and particularly the percentage of African American students who scored advanced in reading were the two characteristics that provided the greatest increase in accuracy of the multivariable linear regression.

*Research Question 4*

What types of schools have the largest percentages of their students fail the Gateway exams?

Because the percentage of students qualifying for free/reduced-price meals was so strongly associated with the pass rates of Gateway exams, schools were divided into quartiles based upon this criterion. Table 18 shows the percentage of students passing each of the three Gateway exams in four quartiles based upon the percentage of students qualifying for free/reduced-price meals.

Table 18  
*Pass Rates of Gateway Exams for Quartiles Based Upon the Percentage of Students Who Qualified for Free/Reduced-Price Meals*

	N	% Free/Reduced	Algebra I % Pass	Biology I % Pass	English II % Pass
Quartile I	70	19.5	89.4	98.0	94.8
Quartile II	70	35.4	84.6	96.2	91.4
Quartile III	71	47.9	78.8	95.7	90.7
Quartile IV	70	72.7	69.3	92.3	85.7

The pass rates declined for all Gateway exams as the percentage of students who qualified for free/reduced-price meals increased. The most significant decline was in the percentage of students who passed the Algebra Gateway exam; it declined 20% from quartile I to quartile IV.

Null Hypothesis #2:

Ho2: There is no difference in the percentage passing Gateway exams between schools with a high percentage of students who qualify for free/reduced meals and schools with a low percentage of students who qualify for free/reduced meals.

A *t* test for independent samples was used to test null hypothesis #2. The results are shown in Table 19.

Table 19

*Independent Samples t Test for Equality of Means of the Percentage of Students Who Pass Gateway Exams Between Quartiles I and IV That Were Based Upon the Percentage of Students Who Qualified for Free/Reduced Meals*

Student Variables	Variances	<i>t</i> test for Equality of Means			Sig. (2-tailed)	Mean Difference
		Sig.	<i>t</i>	<i>df</i>		
% Proficient & Advanced Algebra I 2004	Equal variances assumed	.000	9.328	136	.000	20.096
% Proficient & Advanced Biology I 2004	Equal variances assumed	.000	8.023	137	.000	5.710
% Proficient & Advanced English II 2004	Equal variances assumed	.000	9.589	138	.000	9.029

The significant values or *p* values are all .000, indicating that the difference in means between quartiles I and IV are statistically significant. The *t* values all exceed the critical value of +/-1.98 for an alpha of .05 and 138 degree of freedom; therefore, null hypothesis #2 must be rejected and the alternate hypothesis retained. There is a significant difference between the percentage of students passing the Gateway exams between quartile one containing the lowest

percentage of students who qualified for free/reduced meals and quartile IV containing the highest percentage of students who qualified for free/reduced-price meals.

Because the percentage of Caucasian students was so strongly associated with the pass rates of Gateway exams, schools were divided into quartiles based upon this criterion. Table 20 shows the percentage of students passing each of the three Gateway exams in four quartiles based upon the percentage of Caucasian students.

Table 20

*Pass Rates of Gateway Exams for Quartiles Based Upon the Percentage of Caucasian Students*

Quartiles	N	% Caucasian Students	Algebra I % Pass	Biology I % Pass	English II % Pass
Quartile I	70	98.6	83.2	96.6	91.6
Quartile II	70	94.4	86.6	97.2	93.1
Quartile III	68	81.4	85.1	96.7	92.4
Quartile IV	68	28.5	66.7	91.8	85.5

Quartile II had the highest percentage of students passing the Gateway exams. Quartile III had the second highest percentage; quartile I was third, and quartile IV had the lowest percentage of students passing the Gateway exams. Quartile IV containing the most minority students was considerably lower than the other quartiles, but the quartile containing the most Caucasian students was lower than those quartiles containing a mix of minorities. The low pass rate for Gateway Algebra in quartile IV that contained the most minority students revealed that one third of these students failed the exam.

Null Hypothesis #3:

Ho3: There is no difference in the percentage passing Gateway exams between schools serving predominantly Caucasian students and schools serving a high percentage of minority students.

A *t* test for independent samples was used to test null hypothesis #3. The results are shown in Table 21.

Table 21

*Independent Samples t Test for Equality of Means of the Percentage Passing Gateway Exams Between Quartiles I and IV That Were Based Upon the Percentage of Caucasian Students*

Percentage of Proficient and Advanced Student Scores in Quartile I and IV	Variances	<i>t</i> test for Equality of Means			Sig. (2-tailed)	Mean Difference
		Sig.	<i>t</i>	<i>df</i>		
% Proficient & Advanced Algebra I 2004	Equal variances assumed	.000	7.427	136	.000	16.553
% Proficient & Advanced Biology I 2004	Equal variances assumed	.001	6.010	137	.000	4.803
% Proficient & Advanced English II 2004	Equal variances assumed	.000	5.624	138	.000	6.129

The significant values or *p* values are all .000 or .001, indicating that the difference in means between quartiles I and IV are statistically significant. The *t* values all exceed the critical value of +/-1.98 for an alpha of .05 and 138 degree of freedom; therefore, null hypothesis #3 must be rejected and the alternate hypothesis retained. There is a significant difference between

the percentage of students passing the Gateway exams between quartile one containing the lowest percentage of Caucasian students and quartile IV containing the highest percentage of Caucasian students.

Because the percentage of students qualifying for free/reduced-price meals and the percentage of Caucasian students were both strongly associated with the pass rates of the Gateway exams, the schools that met the criteria for the quartiles with the lowest scores in both categories were selected. The selected group of high schools had over 72.7% of their students qualifying for free/reduced-price meals and had fewer than 28.5% Caucasian students. The 24 high schools that met the criteria are listed in alphabetical order: Austin East, Brainerd, B.T. Washington, Carver, East, Fairley, Fayette Ware, Frayser, Hamilton, Hillcrest, Howard, Maplewood, Melrose, Mitchell, Northside, Oakhaven, Pearl Cohn, Sheffield, South Side, Stratford, Treadwell, Trezevant, Westside, and Westwood High School. The percentages of students passing the Gateway exams, for these 24 schools are: Algebra I = 53.75%, Biology I = 88.25%, English II = 78.37%. Almost half of the students in this group of schools failed the Algebra Gateway exam in 2004.

Research Question #4 addressed, “What types of schools have the largest percentages of their students fail the Gateway exams?” The answer is, poor schools serving a large percentage of minority students. The Algebra I Gateway exam was especially difficult for this group of students with almost half of them failing it.

## CHAPTER 5

### SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to examine the relationships between school characteristics and the pass/fail rates on Gateway exams in Tennessee high schools. Pearson correlations were performed between the pass/fail rates on Gateway exams and socioeconomic status, ethnicity, dropout rate, graduation rate, attendance, average daily membership, per-pupil expenditure, teacher salary, and elementary reading scores. School characteristics that were most strongly associated with pass/fail rates on Gateway exams were used as predictor variables in multivariable linear regressions with pass/fail rates as the dependent variable. High schools were divided into quartiles based upon the percentage of students who qualified for free/reduced-price meals and the percentage of Caucasian students attending each high school. The pass/fail rates on the Gateway exams were examined for each quartile and independent samples  $t$  tests performed to determine if the differences were statistically significant.

#### *Summary of Findings*

The analysis focused on four research questions and three null hypotheses. The sample included data on 281 Tennessee public high schools that can be found at the 2004 Tennessee Schools Report Card website. Several high schools were eliminated from analysis because of incomplete reports, but the remaining 281 high schools represented over 90% of the public high schools in Tennessee. The data were assembled and analyzed using the Statistical Package for the Social Sciences.

### *Research Question 1*

What are the mean and standard deviation of the percentage of students passing each of Tennessee's Gateway exams in 276 Tennessee high schools?

The mean passing percentage for Gateway Algebra was 80.5% and the standard deviation was 13.7. The mean passing percentage for Gateway Biology I was 95.6% and the standard deviation was 4.5. The mean passing percentage for Gateway English was 90.7% and the standard deviation was 6.1.

### *Research Question 2*

What school characteristics are most strongly associated with the percentage of students passing each of the three Gateway exams?

Graduation rates and the percentage of Caucasian students were most positively associated with the passing percentage on Gateway exams. Dropout rates and the percentage of students who qualified for free/reduced-price meals were most negatively associated with the passing percentage on Gateway exams. The highest Pearson correlation value was .720 between the graduation rate and the percentage passing the Gateway English exam. A Pearson correlation value of .669 was found between the graduation rate and the percentage of students passing the Gateway Algebra exam. The percentage of Caucasian students attending high schools also was strongly associated with the percentage of students passing the Gateway exams. The Pearson correlation values ranged from .662 for Gateway Algebra I to .571 for Gateway Biology I. The correlations between the percentage of students passing Gateway exams and per-pupil expenditure and teacher salaries varied widely when schools were divided into quartiles based upon the percentage of Caucasian students.

Of the 54 high schools that reported the percentage of students passing Gateway exams and also reported elementary school data, the percentage of students who scored advanced in elementary reading correlated with Gateway exam pass rates with a Pearson  $r$  value above .5. In



the 18 high schools that reported the percentage of students passing Gateway exams and that also reported the percentage of African American students who scored advanced in elementary reading, the correlations values were approximately .6.

### *Research Question 3*

What combination of school characteristics yields the highest predictive value of the percentage of students passing the three Gateway exams?

The graduation rate, the percentage of Caucasian students, and the percentage of students who qualified for free/reduced-price meals used as predictor variables and the percentage of students passing the Gateway exams used as dependent variables, produced the highest  $R^2$  values. The multivariable linear regression with the percentage passing Gateway Algebra I as the dependent variable yielded an  $R^2$  value of .590. Using the same predictor variables and Gateway biology as the dependent variable produced an  $R^2$  of .416. Gateway English II had an  $R^2$  value of .584 using the same three predictor variables. For the 54 schools that reported both Gateway pass/fail rates and elementary school data, adding the percentage of students who scored advanced in elementary reading to the predictor variables increased the  $R^2$  value for Gateway Algebra I from .590 to .642. For the 17 schools that reported both Gateway pass/fail rates and the percentage of elementary African-American students who scored advanced in reading, adding the African American percentage to the predictor variables increased the  $R^2$  value for Gateway Algebra I from .590 to .773.

### *Research Question 4*

What types of schools have the largest percentages of their students fail the Gateway exams?

Schools were divided into quartiles based upon the percentage of students who qualified for free/reduced-price meals attending each high school. As the percentage of students

qualifying for free/reduced meals increased, the percentage of students passing the Gateway exams decreased. Gateway Algebra I was the most difficult for any quartile to pass ranging from 89.4% for the quartile containing the fewest students who qualified for free/reduced-price meals, to 69.3% for the quartile containing the poorest students. The difference in the percentage of students who passed the Gateway exams between the quartile containing the fewest students who qualified for free/reduced-price meals and the quartile containing the most was substantial. The difference in pass rates for Gateway Algebra I was 20.1%; for Gateway Biology I the difference was 5.3%; and for Gateway English II, the difference was 9.1%. An independent samples *t* test confirmed that the differences in mean percentage pass rates between the quartiles containing the most and fewest students who qualified for free/reduced meals was statistically significant for all three Gateway exams.

Schools were also divided into quartiles based upon the percentage of Caucasian students attending each high school. The quartile containing the fewest Caucasian students had the lowest percentage of students passing all three Gateway exams. The percentages for the quartile containing the fewest Caucasian students were: 66.7% passed Gateway Algebra I, 91.8% passed Gateway Biology I and 85.5% passed Gateway English. The Gateway Algebra I pass rate was very close to the pass rate for the poorest quartile of schools, which was 69.3%. Poor and minority students failed the Gateway exam at an alarming rate. An independent samples *t* test confirmed that the differences in mean percentage pass rates between the quartiles containing the most and fewest Caucasian students was statistically significant for all three Gateway exams.

Because the percentage of students qualifying for free/reduced-price meals and the percentage of Caucasian students were both strongly associated with the pass rates of the Gateway exams, the schools that met the criteria for the quartiles with the lowest scores in both categories were selected. Over 72.7% of the students qualified for free/reduced-price meals, and there were less than 28.5% Caucasian students in the 24 high schools that met the criteria. The percentages of students in these schools that passed the Gateway exams were: Gateway Algebra I

= 53.8%, Gateway Biology I = 88.3%, Gateway English II = 78.4%. The Gateway Algebra I pass rate indicated that almost half of the students attending these 24 high schools failed the exam. The average daily membership of the 24 high schools was 936 pupils; therefore, the failure rate is affecting a large number of students.

### *Conclusions*

#### *Conclusion # 1*

The Algebra I Gateway exam has kept and presumably will continue to keep thousands of Tennessee students from receiving a high school diploma. The failure rate for the Gateway Algebra I exam was more than double those of the other two exit exams as was demonstrated by the data in this study.

#### *Conclusion # 2*

The standard deviation of the percentage of students passing the Gateway Algebra I exam was more than double the other two exit exams. The wider divergence might have been caused by greater variability in Algebra I instruction than in Biology I or English II instruction. If this is the case, then it seems unfair to withhold diplomas from thousands of students because there was a shortage of competent math teachers.

#### *Conclusion # 3*

Despite the fact that all three Gateway exams contain the same number of questions, the cut-scores for determining pass/fail are different. Biology I, with the highest pass rate, requires 20 correct answers to pass, and Algebra I, with the lowest pass rate, requires 30 correct answers to pass. The State Board of Education or the State Department of Education has given no rationale for the positioning of these cut-scores.

*Conclusion # 4*

The association between the percentage of students who pass Gateway exams and graduation rates may indicate that, in some instances, students who fail the exit exams are dropping out of school. Based on this study, it appears Tennessee's new exit exam requirements may continue to contribute to dropout rates that are already too high.

*Conclusion # 5*

The association between the percentage of students who pass Gateway exams and the percentage who qualify for free/reduced-price meals indicates that a larger percentage of poor students fail Gateway exams. Less than 12% of the students failed the Gateway Algebra I exam in the quartile containing the schools with the lowest percentage of students who qualified for free/reduced-price meals. More than 30% failed the Gateway Algebra I exam in the quartile containing the schools with the highest percentage of students who qualified for free/reduced-price meals. Unless poor students have access to quality Algebra I instruction and remediation, it is probable that large numbers will be denied diplomas, thus, exacerbating the social divide between the rich and the poor.

*Conclusion # 6*

The association between the percentage of students who pass Gateway exams and the percentage of Caucasian students indicates that a larger percentage of minority students fail the Gateway exams. Approximately one third of the students failed the Gateway Algebra I exam in the quartile of schools containing the highest percentage of minority students. Unless minority students have access to quality Algebra I instruction and remediation, it stands to reason that large numbers will be denied diplomas and the economic gap between the races will widen.

### *Conclusion # 7*

The negative predictors “economically disadvantaged” and “African American” place students in double jeopardy regarding Gateway exams. Almost half of the students in poor, Black schools failed the Gateway Algebra I exam. One solution to the problem might include examining the cut score for passing Gateway Algebra, insuring quality instruction for poor, Black students, and providing extensive remediation. If no action is taken, it is likely, based on data presented here, that nearly half of the poor, Black students in the state will fail to graduate from high school.

### *Recommendations to Improve Practice*

1. The state of Tennessee should provide early intervention and extensive remediation for poor and minority students who are in danger of failing Gateway exams.
2. The state of Tennessee should closely monitor its dropout rate since the implementation of Gateway exams.
3. The rationale for the placement of the cut-scores that determined the pass/fail score on Tennessee Gateway exams should be made available to the public.
4. Tennessee should follow Maryland’s lead and average the scores on the three Gateway exams. Making a diploma contingent on each of the three Gateway exams is in clear violation of standard 13.7 from the *Standards for Educational and Psychological Testing* (American Educational Research Association, 2004) that states, “In an educational setting, a decision or characterization that will have a major impact on a student should not be made on the basis of a single test score. Other relevant information should be taken into account if it will enhance the overall validity of the decision” (p. 146). A single test score from Gateway Algebra has and will keep thousands of students from graduating. Just as the ACT college entrance exam produces a composite score from four subtests, the Gateway exams should yield

- a composite score from its three tests. Averaging the Gateway scores should allow students who are weak in Algebra I to compensate by scoring well in English II or Biology I. It would also allow students who are struggling with English to compensate by scoring well in Algebra I or Biology I.
5. The State Board of Education stated that it chose Algebra I, English II, and Biology I as Gateway exams because research demonstrated that competency in these areas is important to college and workplace success. This research should be made available and widely disseminated to the public.
  6. The practices of schools that have high pass rates on Gateway exams despite serving poor and minority students should be studied and the best practice disseminated to other Tennessee schools.

#### *Recommendations for Further Research*

1. An ongoing analysis of the dropout rates of states that have initiated high school exit exams should be compared to states without exit exams.
2. A comparison of standardized test scores between states with and without high school exit exams should be analyzed.
3. An analysis of the per-capita income of the poorest segment of society in states with high school exit exams and a comparison between states with and without exit exams should be researched.
4. A study to determine the impact of Gateway exit exams on Special Education students should be developed.
5. Articles should be written about schools with successful Special Education Gateway pass rates and made available to directors and principals to explore methods of teaching that might increase achievement in other schools.

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