A Descriptive Statistical Analysis of the Relationships Between Socioeconomic Status, Attendance Rates, Per Pupil Expenditures, Teacher Qualifications, and On-Time Educational Attainment Rates within the State of Virginia Including a Comparative Study of the Appalachian and Non-Appalachian School Division

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ABSTRACT

PURPOSE

This study had two purposes: (a) to examine the possible predicting abilities of socioeconomic status, per pupil expenditures, percentage of highly qualified teachers and attendance rates for on-time educational attainment in the state of Virginia and (b) to compare the Appalachian School Divisions of Virginia with the non-Appalachian school divisions for each of these variables.

METHOD

Data pertaining to socioeconomic status, per pupil expenditures, attendance rates, teacher qualifications, and on-time educational attainment were collected for the graduating cohorts of 2005, 2006, 2007, and 2008. A stepwise multiple regression analysis was conducted on these variables to address the first purpose. A general linear model repeated measures ANOVA was conducted for each variable to compare differences between the Appalachian, non-Appalachian divisions of similar size, non-Appalachian large school divisions, and the total non-Appalachian divisions to address the second purpose of the study.

RESULTS

Socioeconomic status and attendance rates were found to be the independent variables that were significantly able to predict on-time educational attainment rates. Socioeconomic status rates were found to be significantly higher in the Appalachian divisions than in the non-Appalachian large school divisions. Teacher qualification rates were found to be significantly higher in the Appalachian divisions than the non-Appalachian divisions of similar size. On-time educational attainment rates were found to be significantly higher in the Appalachian school divisions than in all three classifications of the non-Appalachian divisions.

DEDICATION

To my wife, Jane, who has been my biggest supporter through what seems like 20 years of continuous educational pursuits.

To my mom, Carol Sue, who had to give up her own educational pursuits to raise a family and then lost a battle with cancer just as she was about to be able to begin them once again.

To Mamaw, Garnett Forren Simmons, who taught me that being raised penniless in a log cabin in the backwoods of Snake Run, WV doesn't mean you have to live your life poorly.

To Papaw, Charles Simmons, who was quite possibly the most intelligent sixth grade drop out who ever lived. He taught me that having a good sense of humor and an occasional cigar under a shade tree by the river are essential ingredients to a content life.

To my dad, Gary, who passed down the discipline and drive that have served me well in the military, at work, and throughout these courses.

To my youngest sister, Lora Beth, who had to endure two rough years at a time that should have been the most carefree in her life.

To my granddaughter, Samantha, who sacrificed many hours of playground time and tent building in the house so that I attend class and work on this dissertation.

Finally, this is dedicated to every native Appalachian. We are the last remaining ethnic group who can still be openly ridiculed without consideration for political correctness. Hopefully, the results of this study show that we are a little more complex than we've been portrayed in the media.

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CHAPTER I

INTRODUCTION

Background of the Study

The Appalachian region of the United States has a long history of being perceived negatively by the rest of the country. Many of these negative views were shaped by the media, which in years past portrayed Appalachia as being "replete with inbred banjo pickers, violent feuds, moonshine, sexual deviltry, and miasmic gorges" (Biggers, 2005, p. xiii). In the 1960s, the negative portrayals and perceptions of Appalachia reached new heights when Presidential Candidate John F. Kennedy used the region in his campaign advertisements to shock the country and President Lyndon Johnson designated Appalachia as the primary battleground in his war on poverty (Bradshaw, 1992). Despite advancements in housing, health care, and educational opportunities during the last half of the twentieth century, much of the United States still maintains a somewhat unfavorable view of the region (Shaw & Blethen, 2004).

In the United States, one in four ninth grade students will not earn a high school diploma within four years; for minorities the ratio is one in three (The Education Trust, 2007). These individuals will likely struggle to earn a wage that keeps their family's standard of living above the poverty line. The median annual income for a high school dropout in the U.S. is approximately $7,000 below that of a high school graduate (Murray & Naranjo, 2008). In the United States, high school dropouts create a loss in income and tax revenue totaling $192,000,000 or 1.6% of the gross domestic product each year (Milliken, 2007).

In most areas of Southwest Virginia the percentage of the workforce with a high school diploma or equivalent has not been on par with the rest of the state (Haaga, 2004). This may be due to a lower high school graduation rate over the years. During the years ranging from 1970 to 2000, the Appalachian Counties of Virginia maintained an adult population (ages 25+) who possess a high school diploma or equivalent that ranged 12-17% below the state average (Appalachian Regional Commission, 2004). The Appalachian counties with the lowest adult educational attainment can be found in the mining regions of central Appalachia, which includes a large portion of Southwest Virginia (Haaga, 2004). A lower level of educated adult population and a history of outside negative perceptions cause civic and educational leaders in Southwest Virginia to be faced with many arduous problems (Shaw, DeYoung, & Rademacher, 2004).

Statement of the Problem

An examination of data sets and reports published by the Appalachian Regional Commission reveals ample evidence to support the idea that educational attainment in the Central and Southern Appalachian counties lags behind the rest of the country (Haaga, 2004). Members of this undereducated adult population have less earning potential, utilize more social services, and are more likely to live in poverty than the people who live in areas with greater average educational attainment levels (De Sousa & Gebremedhin, 1999). Appalachia's higher than average poverty rates and below average educational levels combine to prevent the region from progressing at the same rate as the rest of the country (Shaw, DeYoung, & Rademacher, 2005). This lack of an educated adult workforce renders the region less attractive to businesses and industries that may be looking to expand their operations (De Sousa & Gebremedhin, 1999). If the cycle of poverty is to be reversed in Appalachia, there needs to be a more thorough look at its school systems and the factors that influence education followed by progressive action to correct any problems or address any issues that are found.

Statement of the Purpose

The purposes of this study are: (a) to examine the possible predicting abilities of socioeconomic status (SES), per pupil expenditures (PPE), percentage of highly qualified teachers, and attendance rates with on-time educational attainment in the state of Virginia and (b) to compare the Appalachian School Divisions of Virginia with the non-Appalachian school divisions for each of these variables.

Determining whether or not any of the independent variables predict on-time educational attainment will hopefully provide educators in Virginia a formula that can be used to project one form of student achievement. The comparative analysis between the Appalachian and non-Appalachian divisions should identify any statistically significant differences between the school division classifications with regards to the five measured variables. In order to create a more accurate analysis of the state of Virginia, the non-Appalachian school divisions will be categorized as being of similar size to the Appalachian divisions, larger than the Appalachian divisions, and as an entire non-Appalachian region. Research questions have been developed to assist in facilitating the purposes of this study.

Research Questions

The following four research questions will guide the dissertation:

1. Which, if any, of the independent variables of socioeconomic status, percentages of highly qualified teachers, attendance rates, and per pupil expenditures predict the dependent variable of on-time educational attainment in the state of Virginia?
2. How do the Appalachian school divisions of Virginia compare to all of the non-Appalachian school divisions of similar size in Virginia with regard to per pupil expenditures, socioeconomic status, percentages of highly qualified teachers, attendance rates, and on-time educational attainment rates?
3. How do the Appalachian school divisions of Virginia compare to the larger non-Appalachian school divisions of Virginia with regard to per pupil expenditures, socioeconomic status, percentages of highly qualified teachers, attendance rates, and on-time educational attainment rates?
4. How do the Appalachian school divisions of Virginia compare to all of the non-Appalachian school divisions of Virginia with regard to per pupil expenditures, socioeconomic status, percentages of highly qualified teachers, attendance rates, and on-time educational attainment rates?

Significance of the Study

The literature implies that in regards to human capital, the Appalachian region of the United States has not done and is not currently doing enough to promote economic growth through education (De Sousa & Gebremedhin, 1999). Additional descriptive research is needed to better define and evaluate educational attainment in the Appalachian region of Virginia. Since most educational data are produced at the state level and represent the state as a whole, there does not appear to be much regional data available for Virginia. The current study will determine the possible predictive ability of the four independent variables within the state of Virginia that have been found to correlate with educational achievement in previous studies (Clotfelter, Ladd, & Vigdor, 2007; Ram, 2004; Roby, 2004; Toutkoushian & Curtis, 2005) and then compare how the Appalachian school divisions of the state measure up against the non-Appalachian school divisions regarding these independent variables with regard to on-time educational attainment. A

study of these relationships will provide data to civic and educational leaders that may be helpful in their program development, budgetary planning, and in facilitating economic expansion.

Definition of Terms

The following terms and definitions are explained in relation to the current study:

1. *Appalachian School Divisions*. School divisions in Virginia are considered Appalachian if they are being served by the Appalachian Regional Commission as a result of the Appalachian Regional Development Act of 1965. These divisions include Alleghany, Bath, Bland, Botetourt, Buchanan, Carroll, Craig, Dickenson, Floyd, Giles, Grayson, Henry, Highland, Lee, Montgomery, Patrick, Pulaski, Rockbridge, Russell, Scott, Smyth, Tazewell, Washington, Wise, Wythe, as well as the independent cities of Covington, Galax, Radford, Buena Vista, Lexington, Martinsville, Bristol, and Norton. (Appalachian Regional Commission, 2009).
2. *Non-Appalachian School Divisions*. School divisions in Virginia are considered non-Appalachian if they are not included in the definition of the Appalachian divisions.
3. *Non-Appalachian School Divisions of Similar Size*. Non-Appalachian school divisions of Virginia are considered to be of similar size if they enrolled fewer than 9,999 students during the 2000-2001 school year, which was the first year of data that were collected for the current study (J. Craig, personal communication, September 2009).
4. *Non-Appalachian Large School Divisions*. Non-Appalachian school divisions of Virginia are considered to be large if they enrolled at least 10,000 students during the 2000-2001 school year, which was the first year of data that were collected for the current study (J. Craig, personal communication, September 2009).
5. *Low Socioeconomic Students*. Students are classified as low socioeconomic if they receive free or reduced priced lunches (Virginia Department of Education, n.d.c).
6. *Highly Qualified Teachers*. Teachers are considered highly qualified if they meet the federal definition as reported on the Virginia State School Report Cards. The federal definition means that the teacher (1) possesses a bachelor's degree, (2) has obtained full state licensure certification, and (3) has demonstrated knowledge of the subject areas in which they will teach (U.S. Department of Education, 2004).

7. *Attendance Rates*. Attendance rates will be determined by dividing the average daily attendance by the average daily membership for each school division as reported on Table 8 of the state's Superintendent's Annual Report (Virginia Department of Education, n.d.d).
8. *Per Pupil Expenditure*. Per pupil expenditures are the average amounts of local, state, and federal funds used to educate one student in one school year for each school division as reported on table 15 of the state Superintendent's Annual Report. Expenditure categories that go into the per pupil expenditure calculation are administration, instruction, attendance/health services, pupil transportation services, operation and maintenance services (Virginia Department of Education, n.d.d).
9. *On-time Educational Attainment*. High school completion rate that is determined by taking the total number of students who received a standard diploma, advanced studies diploma, modified standard diploma, special diploma, or completed a school division's Individual Student Alternative Education Plan program (Virginia Department of Education, n.d.b) and dividing by the total number of students who made up the ninth grade cohort four years prior to the graduation year with adjustments made for population shifts and ninth grade retentions.
10. *Appalachian Regional Commission*. An organization created in the mid 1960's to address the high levels of poverty and growing economic disparity in the Appalachian region of the United States.
11. *Ninth Grade Bubble*. The large number of ninth graders who are retained each school year (Greene & Winters, 2006).

Limitations

Although most of the information listed to describe the variables used in this study should be reliable, there may be instances where human error or inconsistent reporting methods between the various school divisions lead to the use of incomplete or incorrect data. The researcher could not control for these errors but attempted to acknowledge them in the findings report.

Delimitations

This study is delimited to only public school divisions in the state of Virginia. All data pertaining to the five variables used in the current study can be found in the reports and data

section of the Virginia Department of Education website. The researcher relied on the identification criteria established by the Appalachian Regional Commission to delineate between the Appalachian and non-Appalachian school divisions of Virginia. All variable analyses will be conducted using Microsoft Excel and/or Statistical Product and Service Solutions (SPSS).

Assumptions

Five assumptions can be made regarding this study. The first four assumptions are the basic ones for parametric data (Field, 2005). First, the data are from a normally distributed population. Second, homogeneity of variance exists. Third, the data are measured at the interval level. Fourth, the data from different school divisions are independent and therefore not influenced by other school divisions. The fifth assumption is that the variable means used for comparison are an appropriate representation of the school divisions classified into the Appalachian and non-Appalachian categories. The establishment of these five assumptions will guide the development of the theoretical framework.

Theoretical Framework

The Appalachian Regional Commission has published many reports and studies outlining the educational and economical shortcomings of the Appalachian region of the United States (Black, Mather, & Sanders, 2007; Haaga, 2007). Historically, the central Appalachian states, which include Virginia, have contained an educated adult workforce that is eleven to thirteen percent lower than the United States average (Haaga, 2004). Despite the fact that the number of adults with a high school diploma or GED has increased nationally in the second half of the twentieth century, the numbers in Appalachia have not risen as quickly as other areas causing a growth in the disparity between the Appalachian region and the rest of the country (Haaga, 2004). The current study examined the predicting ability of per pupil expenditures, socioeconomic status, attendance rates, and teacher qualification for on-time educational attainment and also compared the independent and dependent variable data for Appalachian and non-Appalachian Regions of Virginia. In the following diagrams, Figure 1 provides the location of the school division classifications used in the current study and Figure 2 presents the possible predictor variables with the selected outcome variable:

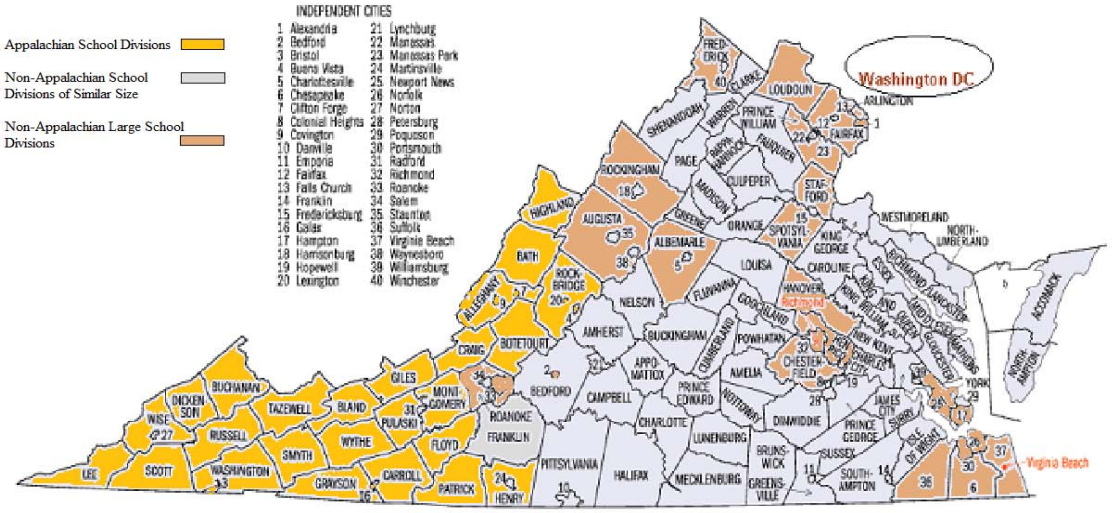

Figure 1. Virginia map indicating the location of Appalachian school divisions, non-Appalachian school divisions of similar Size, and non-Appalachian large school divisions. (Northern Realty, 2009; Siers, 2009)

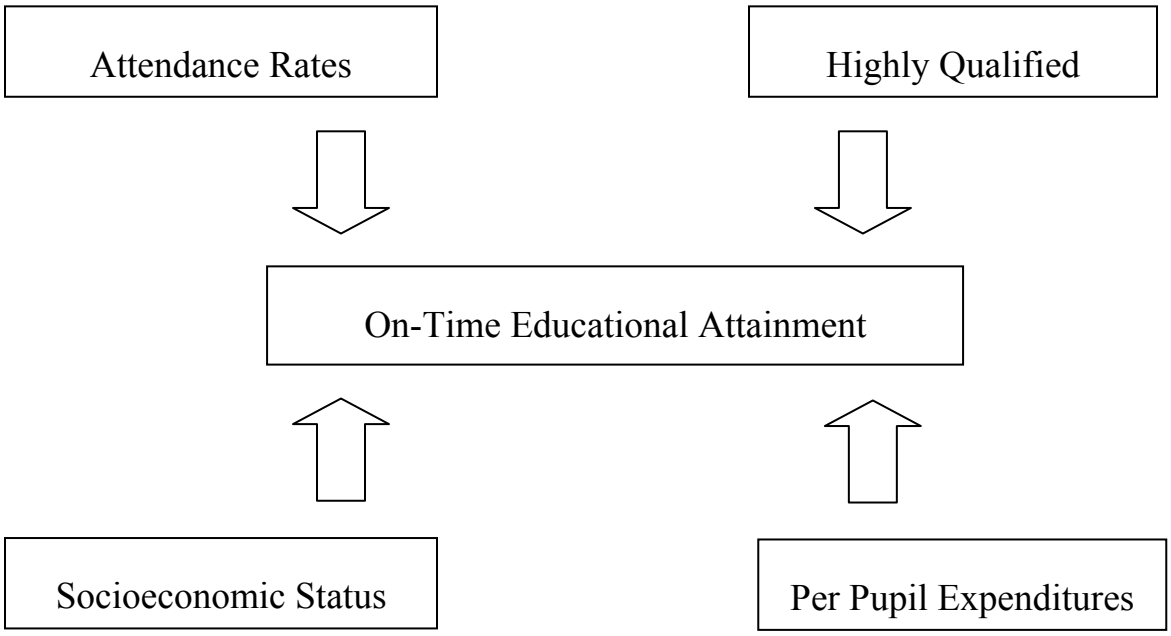

Figure 2. Possible predictor variables of per pupil expenditures, highly qualified teachers, attendance rates, socioeconomic status, and the outcome variable of on-time educational attainment (Siers, 2009).

Organization of the Study

This research study is presented in five chapters. Chapter I is made up of the background of the study, statement of the problem, statement of the purpose, research questions, significance of the study, definition of terms, limitations, delimitations, assumptions, theoretical framework, and organization of the study. Chapter II contains an introduction, sections on the history of education and current status in Appalachia, economic ramifications in Appalachia, school district size, per pupil expenditures, attendance rates, socioeconomic status, teacher qualifications, on-time educational attainment, and a conclusion. Chapter III is titled methodology and contains an introduction, sections on research design, data sources, data collection, data analysis, and a summary. Chapter IV is the presentation and analysis of the data and contains an introduction, a section describing the variable relationships, a comparative analysis section, and a summary of the findings. Chapter V is titled summary and implications and contains an introduction; a summary of the study; implications for educational, civic, and business leaders; suggestions for future research; and a conclusion.

CHAPTER II
REVIEW OF THE LITERATURE

Introduction

The review of the literature guided the current study of the perceived inequalities between students who are educated in the Appalachian and non-Appalachian regions of Virginia. Although the current study looks specifically at the public school systems in Virginia, any findings could be applicable to other states located in the central and southern Appalachian regions of this country. The studies used for this literature review were selected to provide the historical background on educational development in Appalachia, examine the potential influence of district size on student achievement, and demonstrate proven statistical relationships between the four independent variables and student achievement while presenting consistent uniform methods for calculating on-time graduation rates based on accepted practices. The review of the literature is divided into nine subsections: (a) History of Education and Current Status in Appalachia, (b) Economic Ramifications in Appalachia, (c) School District Size (d) Per Pupil Expenditures (e) Attendance Rates, (f) Socioeconomic Status, (g) Teacher Qualifications, (h) On-Time Educational Attainment, and (i) Conclusion.

The research articles used in this review of the literature were obtained primarily through the Virginia Polytechnic Institute and State University Library's website. Searches were conducted in the Education Resources Information Center (ERIC) from Ebscohost and the Education Resources Information Center (ERIC) from the U.S. Department of Education databases using a variety of search phrases based on the titles of each of the first eight sections of this review of the literature. Examples of search phrases used are: Appalachian schools, school district size and student achievement, per pupil expenditures and student achievement, teacher qualifications and student achievement, attendance rates and student achievement, socioeconomic impacts on student achievement, teacher qualifications or credentials and student achievement, high school graduation rates, on-time graduation rates, and high school dropouts in Appalachia. Several articles were not available for direct download through Eric by Ebscohost and had to be requested through the Interlibrary Loan (ILLiad) service. A few of the articles pertaining to Appalachia were obtained from the Appalachian Regional Commission's website. Numerous studies were screened for use in this review of the literature and those selected were

chosen based on timeliness, relevance to the current study, and intelligibility for the researcher of the current study.

History of Education and Current Status in Appalachia

DeYoung and McKenzie (1992) conducted a case study of an Appalachian school system to compare previous research on education in Appalachia to actual practice. The researchers first established a background of Appalachian culture and explained how the school systems in Appalachia evolved at a different pace and in a different form than school systems in the rest of the country. These differences in the development of educational systems may have resulted in the perceptions that Appalachian schools are inferior in quality and less successful than their more cosmopolitan counterparts. Reasons given for these differences were (1) a lack of modern roads until the mid-twentieth century, (2) religious (Protestant) influences on education, (3) lack of economic development (which usually precedes educational improvements), (4) isolation caused by the terrain, corrupt or inept political systems, and (5) a lower standard of living of the populace.

The researchers utilized a case study from an Appalachian school in East Tennessee to evaluate the relationship between schools and community based on an improvement model developed by the Appalachia Educational Lab in 1989. The name of the actual school system used in this study was kept anonymous and the name Clinch County was used in its place. The historical background of the case study verifies that the school system in Clinch County was affected by all of the factors cited as causing Appalachian school systems to develop differently. DeYoung and McKenzie (1992) described in depth how the church controlled education in Clinch County well into the twentieth century through school ownership and curriculum development. The researchers elaborated about problems with the political systems by explaining how the superintendent in Clinch County is elected and therefore has to devote much of his time to fundraising and running for re-election rather than acting as a leader for his school system. The researchers continued by mentioning other issues such as minimal local revenue available for schools, an 80% free or reduced lunch rate in the county, lack of professional development opportunities for teachers, time spent by building principals fundraising for their schools or fulfilling other duties not part of instructional leadership, and a lack of supplies or equipment in the classrooms.

The researchers concluded that there is a problem with previous attempts to improve the relationship between schooling and economic development in Appalachia. DeYoung and McKenzie (1992) stated that, in their view, previous research on this topic has not sufficiently considered the culture and history of the region when drawing conclusions about education and economics. Finally, they emphasized that making a positive change will continue to be difficult unless politicians better comprehend the historical background and cultural issues of the region.

DeYoung and McKenzie (1992) provided the historical background as to why public schools in Appalachia developed at a slower pace and seemingly continue to lag behind the rest of the country. Since comprehending the underlying causes of problems is the first step for finding solutions, understanding the issues that caused the school systems in Appalachia to develop more slowly than in the rest of the country is necessary knowledge for anyone who wants make educational and economic improvements.

Haaga (2004) used data from the 2000 U.S. census to examine the educational attainment of the adult population in the Appalachian region of the United States. He began the study with a statement explaining that educational attainment of the workforce was the most important characteristic considered by prospective investors and employers when looking to establish a business or industry. Haaga went on to explain that high school education and tertiary, post-high school, education were essential predictors of how populations will compete in the global, knowledge-based economy of the twenty-first century.

In the section on regional trends, Haaga (2004) established the fact that educational attainment in Appalachia has improved from the 1960 through 2000. However, conditions have not improved as fast as they have in the rest of the country and the result is that the gap in college graduates between Appalachia and the rest of the country has grown from 6.1 percentage points in 1990 to 6.6 percentage points in 2000. The data used by Haga indicated that the number of adults with a college degree in Appalachia increased from 14.3% in 1990 to 17.7% in 2000 while this number in the United States grew from 20.3% in 1990 to 24.4% in 2000. Haga attributed this growth in the percentage of college graduates to a long-term trend in the U.S. that began in 1960 but states that the growth now seems to be slowing down. He attributed this slow-down in the Appalachian region to limited expectations regarding educational success from the families and educators of students. Haaga stated that limited expectations are more detrimental to success than monetary barriers such as tuition costs.

When mapping the region in terms of adult educational attainment, Haaga (2004) discovered the counties with the lowest levels of educational attainment to be concentrated in the central, mining regions of Appalachia. He found the areas in Appalachia with the highest levels of educational attainment to be scattered throughout the thirteen-state region, especially around the larger metropolitan areas such as Atlanta and in counties that housed large colleges and universities. He also found that Virginia, Kentucky, Ohio, and Maryland had the largest disparities between the Appalachian and Non-Appalachian counties with regards to the percentage of the adult population with a college degree. Virginia and Kentucky were listed as the two states with the highest disparity between the Appalachian and non-Appalachian regions with regards to adults who have obtained a high school diploma or a General Educational Development diploma (GED). This disparity is presented in Table 1. Haaga also reported that the Appalachian region of Virginia has a higher percentage of its population without a high school diploma or GED (30.2%) than with a college degree (14.8%).

Table 1

Educational Disparity Between Adults with a High School Diploma or GED in the Appalachian and Non-Appalachian Regions in Virginia and Kentucky (Haga, 2004)

State Name	Entire State	Appalachian Region	Disparity
Virginia	81.5%	69.8%	11.7%
Kentucky	74.1%	62.5%	11.6%

Note- Percentages are based on adults, aged 25+, who have obtained a high school diploma or GED.

Haaga (2004) attributed the current educational attainment of adults in Appalachia to the quality of the school systems in the region as well as the in-and out-migration of people with various levels of education. In order to analyze the effect of migration on the working age population, the researcher analyzed five groupings of counties in Appalachia: (1) seven counties in north-central Alabama, (2) twenty counties in northeastern Tennessee, (3) twenty-six counties in eastern Kentucky, (4) thirteen counties in southeastern Ohio, and (5) eight counties in north-central and northeast Pennsylvania. Haaga found that the analyzed regions in Alabama, Kentucky, and Tennessee had a larger in-migration of adults with less than a high school

diploma while the counties in Ohio and Pennsylvania had a near balance between the in-and out-migration of adults without a high school diploma or GED. In terms of college graduates, the Appalachian regions in Alabama, Pennsylvania, and Tennessee had an increase, Kentucky balanced out, and Ohio lost more college graduates than it gained. During the time period between 1985 and 1990, approximately 20,000 more college graduates moved away from Appalachia than moved in.

Haaga (2004) described the age gap in the adult population's educational attainment as slow moving but persistent. As the younger, more educated members of the population reached the age of 25 and could therefore be counted as adults on the census reports, the older, less educated members of the population died off. The gap between Appalachian and non-Appalachian population in the 25-34 year old age group with a high school diploma or GED is narrower than in the adult population as a whole. This indicates that the school systems in Appalachia have been making improvements in graduating students with a high school diploma or equivalent.

The implications of Haaga's (2004) study are that Appalachia has become somewhat fractured in the levels of educational attainment within the adult population. Appalachian counties in northern states, those in close proximity to larger metropolitan areas, and counties that house large colleges and universities have shown substantial growth in their educated adult population over the last two decades. While the growth for these Appalachian regions has occurred, the poorer counties of central Appalachia have seen the gap widen with regards to the percentage of the population without a high school diploma or GED. Haaga stressed the importance of creating educational policies that encourage educational attainment while at the same time developing a means to attract a more educated population into the region. The economic growth of the Appalachian region will depend on its ability to attract or develop and retain an educated workforce.

Economic Ramifications in Appalachia

Levels of educational disparity in the Appalachian region of the United States could be related to the standards of living throughout Appalachia (De Sousa & Gebremedhin, 1999). Generally, areas with a less educated workforce are more likely to have a higher percentage of their population living in poverty. In this section, the researchers provided information about how the standards of living in the region have changed during the years between 1960 and 2000

and look at the economic impacts of high student dropout rates in a state that is made up entirely of Appalachian counties.

Black, Mather, and Sanders (2007) began their study about economic conditions in Appalachia with an update on several economic indicators within the Appalachian region. During the period between 1970 and 2000 the poverty rate in Appalachia dropped from 17.8% to 13.7%. The average per capita family income increased from $42,000 to $55,000 (in 2000 dollars). Unemployment fluctuated but was higher at 5.7% in 2000 than in 1970 when it was at 4.0%. The participation of men in the labor force declined slightly while the participation of women in the labor force rose from 37% to 53%. The researchers identified two questions that were to be examined in their report: (1) to what extent have economic gains led to improvements in Appalachian living standards? and (2) have Appalachian living standards approached the typical standards for families in the rest of the United States?

The researchers listed a diffusion of technology, population losses in distressed areas, economic spillover from metropolitan areas, and a focus by the Appalachian Regional Commission as reasons for the improved standards of living in the Appalachian region of the U.S. The percentage of the population living in poverty has decreased by 4.1 percentage points from 1969 to 1999 in Appalachia while the U.S. average decreased only 1.3 percentage points. However, Black, Mather, and Sanders (2007) pointed out that the poverty rates remain extremely high in the sparsely populated rural areas.

Black, Mather, and Sanders (2007) utilized decennial data from the census long forms dating from 1960 to 2000 in their study. The researchers identified two limitations in using these census data for their study: (1) the same statistics are not calculated consistently over time and (2) no public statistical data are available from the 1960 census. The census data used represents 25 percent of the 1960 U.S. households, 20 percent of the 1970 U.S. households, and 1 in 6 households from 1980 to 2000. The researchers analyzed trends in consumption and housing as the indicators of the standards of living in Appalachia.

The researchers chose homeownership as one measurement of living standards because their research showed that children were more likely to thrive in homes that were owned rather than rented and because home ownership promotes good citizenship, civic participation, and social networks. Home ownership in the U.S. had consistently risen since 1960 and was at an all time high in 2000. The 2000 census data shows that in Appalachia the percentage of homes that

were owner occupied was 73% compared to 66% in the rest of the country. In central Appalachia, which includes the Appalachian counties of Kentucky, Virginia, and West Virginia the home ownership rate was at 76%.

Black, Mather, and Sanders (2007) attributed the higher percentage of home ownership in Appalachia to lower housing prices, which in many areas was less than 50% of the national average and to the large percentage of mobile homes purchased. In 2000, 14% of all homes owned in Appalachia were mobile homes compared with only 6% in the nation. In the central Appalachian region, 25% of homeowners were living in mobile homes in 2000. The researchers stated that the high number of mobile homes in the region could be both positive and negative in terms of living standards. The positive aspect is that mobile homes allow poor families to move out of housing conditions that were threatening to their health and safety. However, the negative aspect is that mobile homes carry a stigma of poverty that reinforces many stereotypes about rural Appalachian families.

Black, Mather, and Sanders (2007) used household crowding, age of the housing stock, and plumbing facilities as a measure of the quality of housing. Appalachia has less household crowding than the rest of the country with 2.9 rooms per person compared with 2.7 nationally. Central and southern Appalachia has experienced a boom in new housing since 1970 and as a result the housing stock is not aging at the same rate as the northern Appalachian counties and the rest of the country. Historically, the plumbing facilities in Appalachia have been inferior to the rest of the country. However, since 1960 central and southern Appalachian counties have caught up with the rest of the country and now nearly 100% of homes have complete plumbing. This is a marked improvement from the 1960 census data which showed indoor plumbing rates of 45% in central Appalachia, 65% in southern Appalachia, and 85% in northern Appalachia, and 87% in the rest of the U.S.

To measure consumption as an indicator of living standards, Black, Mather, and Sanders (2007) used telephone availability, air conditioning/heating, and vehicle ownership. In 1960, 43% of the homes in central and southern Appalachia had a telephone. In 2000 telephone services were being utilized in 93% of the homes in this region. This is compared with an increase from 79% to 98% for the rest of the U.S. during this same time period. Over the forty year period between 1960 and 2000, Appalachia has become less dependent on coal and wood heat and came more in line with the rest of the country in regards to the types of fuel used to heat

homes. In central Appalachia the percentage of homes heating with wood or coal dropped from 67% in 1960 to approximately 27% in 2000. Homes with air conditioning increased from 7% to 43% from 1960 to 1980. Data regarding air conditioning were not available from the 1990 and 2000 census. Vehicle ownership has remained consistent between Appalachia and the rest of the country since 1980. In Appalachia the number of vehicles per household increased from 1.6 to 1.8 while it increased from 1.6 to 1.7 for the rest of the country.

Black, Mather, and Sanders (2007) concluded their study by recognizing the improved economic conditions in the Appalachian regions from 1960 to 2000. Family earnings have increased. Home-ownership and housing quality improved greatly and in some respects is higher than the national average. Telephone service has increased to nearly match the rest of the nation. The Appalachian region of the U.S. has made large strides since 1960 in developing economically and improving the standards of living for its inhabitants. However, the following study reveals that problems still exist with regard to the impact that educational attainment has on economical development in the more rural counties of Appalachia.

De Sousa and Gebremedhin (1999) utilized an ordinary least squares regression method to examine the relationships between high school dropouts and economic development in West Virginia. The researchers cited a 1997 study conducted by the National Center for Educational Statistics which found that high school dropouts in 1995 earned only $.48 for every dollar earned by a high school graduate. This amount was a decrease from the $.67 to $1.00 ratio that was found when the same study was conducted in 1987. De Sousa and Gebremedhin stated that since high school dropouts earn less they "generate fewer tax receipts and are more frequent recipients of welfare and unemployment payments" (p.4).

In the literature review of their study, De Sousa and Gebremedhin (1999) primarily cited researchers of human capital theory as support for their own theory on how high dropout rates were stifling economic development and perpetuating the poverty cycle in West Virginia. The authors stated that these studies in human capital had proven that the less educated have fewer employment opportunities, were more likely to be unemployed, and earned less causing them to pay fewer taxes throughout their lives. De Sousa and Gebremedhin implied that states with high dropout rates, such as West Virginia, must improve their educational attainment levels before they can experience an increase in economic successes.

De Sousa and Gebremedhin (1999) listed three objectives for their study: (1) "Establish the theoretical and empirical relationship between human capital formation and employment availability in West Virginia" (p.4). (2) "Determine empirically the implications of high school dropouts in the economic development of West Virginia" (p.4). (3) "Draw some relevant policy implications from the research findings" (p.4).

The researchers' methodology included the development of an econometric model that utilized an ordinary least squares regression method. The researchers used employment rate as the dependent variable representing economic development and regressed it against three independent variables- real unemployment per capita, high school dropout rates, and real Gross State Product per capita. De Sousa and Gebremedhin (1999) obtained the data used in this study from the West Virginia Bureau of Employment Programs, West Virginia Department of Education, and the Bureau of Economic Analysis.

The results De Sousa and Gebremedhin (1999) found in regards to the effect of high school dropouts on employment rates were opposite from what was expected. The researchers found that increasing the dropout rate would increase the employment rate. De Sousa and Gebremedhin attributed this to two factors. First, West Virginia is primarily considered rural, which could cause lower financial returns to education therefore reducing the incentive for youths to finish school. Second, West Virginia has a high availability of unskilled jobs that, while increasing the employment rate, does not improve the standard of living. In regards to real gross state product per capita and real unemployment compensations, De Sousa and Gebremedhin's (1999) findings were more in line with what was expected. The researchers found that higher real gross state product per capita significantly increased the percentage of employment ($p<.01$). The researchers stated that this finding was consistent with the theory of economic growth. Businesses that were doing well during economic expansions invested in creating new businesses, which increased job opportunities thereby leading to a higher employment rate. These researchers found that an increase in real unemployment compensation per capita decreased the employment rate by 4.5%. De Sousa and Gebremedhin concluded that this meant unskilled workers were more likely to remain unemployed if their unemployment compensations were large enough for them to get by.

De Sousa and Gebremedhin (1999) concluded by stating "it seems that the long obvious notion that education is the important ingredient in national economic growth is not necessarily

applicable to local economic growth" (p. 12). However, the researchers believed that the positive relationship between high dropout rates and higher employment rates in West Virginia is indicative of a lack of firms in the state who utilize a highly skilled labor force. This lack of economic investment to create a demand for higher skilled workers has forced many of the more educated people in the state to move outside of West Virginia for employment. The researchers labeled this outward migration of the educated workforce as problematic since the area loses a significant return on its educational investment.

De Sousa and Gebremedhin (1999) recommend four steps for schools and communities to implement in order to improve the situation in West Virginia. First, school systems need to identify and monitor students who are at high risk for dropping out. Second, school systems should develop more extracurricular and vocational opportunities that may encourage more students to stay in school. Third, school systems should increase social integration opportunities within the schools and communities. Fourth, schools systems need to "create foundations that would provide students with support to attend and finish high school and pursue technical training and guarantee them a job in the community upon graduation" (p. 14). The researchers concluded that in order for rural communities to prosper, their economy could not be based on low paying jobs with an undereducated workforce.

School District Size

One important aspect of the current study is the comparison of the Appalachian school divisions, the non-Appalachian school divisions of similar size, and the non-Appalachian large school divisions. While it is interesting to know how the Appalachian school divisions compare with the non-Appalachian school divisions as a whole, the additional breakdown of the non-Appalachian school divisions provides a more complete analysis for the state of Virginia. The following two research studies present the importance and implications of considering school district size as part of the comparative analyses that address the second, third, and fourth research questions in the current study.

Yan (2006) performed descriptive statistical analyses and inferential statistical analyses to compare and assess whether or not the structure of school districts impacted fiscal management, administrative capacity, and student achievement in Pennsylvania. The researcher classified Pennsylvania's school districts as rural countywide, rural non-countywide, and mixed rural-urban for the purposes of his study. Yan utilized national data from the Common Core of

Data (CCD) and Pennsylvania state data for the 1999-2000 school year to conduct the analyses. According to Yan (2006), previous research regarding the relationship between school division size and student achievement was inconclusive and often contradictory since any previous studies focused on the effects of individual school size rather than district size. Yan also explained several other factors that had limited previous studies of this topic such as socioeconomic status, curriculum, and urban/rural distinctions.

Yan's (2006) methodology included using the National Center for Education Statistics' (NCES) locale code to classify 267 of Pennsylvania's 500 active school districts as rural countywide, rural non-countywide, and mixed rural-urban. Urban and suburban districts were not included in Yan's study. The researcher developed profiles for each of the 267 districts with regards to fiscal issues, administration, and student achievement. Yan then utilized an analysis of variance (ANOVA) to determine if statistically significant differences existed between the three types of districts.

In the results on the fiscal issues, Yan (2006) reported findings that he determined were significant. First, rural countywide districts had significantly larger expenditures than the rural non-countywide districts. Second, rural countywide districts had a significantly higher student enrollment than the other two types of districts used in the study. Third, rural countywide districts had a significantly higher number of schools than the rural non-county wide and the mixed rural-urban districts. The researcher found no statistically significant differences in the areas of median household incomes, unemployment rates, school size, and per pupil expenditures.

In his results on administrative capacity, Yan (2006) found no statistically significant results in the areas of student-instructional aide ratios, student-library support ratios, student-administrator ratios, and student-counselor ratios. Yan found a statistically significant difference between the number of computers per school with the rural countywide districts having 85, rural non-countywide having 101, and mixed rural-urban having 116. Yan (2006) also determined that a similar statistically significant pattern existed between the rural non-countywide district and the mixed rural-urban districts in regards to CD-ROMS and library holdings.

Yan (2006) reported a few statistically significant findings with regards to student achievement. Student achievement was defined as results on the Pennsylvania System of School Assessment (PSSA) math and reading tests at the 5^{th}, 8^{th}, and 11^{th} grade levels. Mixed rural-

urban school districts had significantly higher reading mean scores at all three grade levels than the rural non-countywide districts. Mixed rural-urban districts also had significantly higher math scores at the 5th and 8th grade levels than the rural non-countywide districts while the 11th grade differences were statistically insignificant. In regards to SAT scores, mixed rural-urban district scores were significantly higher in verbal and math than the rural non-countywide districts. Yan also found a statistically significant difference between the mixed rural-urban districts and the rural non-countywide districts with regards to the percentage of students who planned to attend college, 66% and 59% respectively. Rural countywide school districts had significantly higher percentages of their students planning to join the military after graduation while rural non-countywide districts had a significantly higher percentage of its students planning to become homemakers.

Yan (2006) concluded that his study did not support the idea of school district consolidation in rural Pennsylvania. Although each area of the study contained some statistically significant results, most differences existed between the rural non-countywide districts and the mixed rural-urban districts. The rural countywide districts were usually in the middle and did not provide many statistically significant differences. However, even though his findings did not support district consolidation, Yan (2006) did advocate for policymakers to use his findings to attempt an equalization of educational resources and did encourage an additional study to determine if school district consolidation would benefit urban and suburban districts. In the following study, a researcher examines the relationship between school district size and student achievement in West Virginia.

Howley (1996) performed a study of West Virginia data that replicated an earlier study conducted by Friedkin and Necochea (1988) in California that had determined significant relationships existed between school and school district size and student achievement. Howley believed that this was a relevant study for West Virginia because of the high percentage of schools that were closed during the early 1990's in order to open larger schools and because of the call by legislators to utilize school district consolidation as means for cost control in light of the state's out-migration problem. The findings of the California study were that small schools and school districts had improved achievement for the low socioeconomic students while the larger schools/districts had positive effects for the more affluent students.

Howley (1996) used schools and school districts as the unit of analysis in his methodology. The researcher defined size as the enrollment per grade level or by school district. SES was defined as the percentage of students receiving free or reduced lunches at the school level and as the percentage of adults without a 12^{th} grade education for the district level. Student achievement was defined as performance on the Comprehensive Test of Basic Skills (CTBS). The researcher also used an interaction variable consisting of the product of size and SES. All size and SES data were collected from the Common Core of Data and the National Center for Educational Statistics School District Data Book. The West Virginia Department of Education furnished the CTBS data. Howley utilized the following regression equation, developed by Friedkin and Necochea (1988) in their study, for his research:

ACHIEVEMENT= SIZE + SES + (SIZE x SES)

Howley (1996) found that the relationship between size and achievement was negligible. However, he was able to determine that size through its interaction with SES did influence achievement in 75% of the school level analyses and in 100% of the district level analyses. The researcher stated that his results were consistent with those of Friedkin and Necochea (1998) in that the large school districts had lower achievement scores for the poorer students and higher achievement scores for the more affluent students. School level results were similar in every category except for grade 3 where the results were not significant. The researcher stated that the consistency of his findings with those of Friedkin and Nocochea should give policy makers pause for thought about the benefit of consolidating small schools and school divisions. Howley recommended that it would be beneficial to structure school and district size based on the SES status of the students. However, Howley cautions that size relationships are not easily defined and other factors such as class size and personal size, defined as "psychological or social space" (p. 31), may also play a role with influencing achievement.

The articles used in the previous three sections of the literature review provided the foundation from which the current study originates. DeYoung and McKenzie (1992) provided the historical background explaining the reasons that educational programs and practices in Appalachia developed at a slower pace than in the rest of the United States. Haaga (2004) concluded that despite recent gains, there still exists a disparity between the Appalachian counties/cities and non-Appalachian counties/cities of Virginia in regards to the number of adults who have reached either the high school or college level of educational attainment. Black,

Mather, and Sanders (2007) explained how the standards of living in the Appalachian region of the country improved from 1960 to 2000, which is cause to explore how these advancements may be affecting the regions' educational attainment in the new century. De Sousa and Gebremedhin (1999) found that areas of Appalachia with high dropout rates, such as the state of West Virginia, could expect a perpetuation of poverty as its citizens would likely never benefit from the higher paying skilled positions that tend to develop in regions with a better educated workforce. Yan (2006) examined the differences in finances, administration, and achievement with regards to school district composition and found the mixed rural-urban districts to be the most successful. Howley (1996) successfully replicated a larger California study, which determined that a school district's size interacts with the percentage of low SES students to influence achievement at the district level.

The following five sections will review literature pertaining to the variables that were used in the current study to compare the Appalachian and non-Appalachian school divisions of Virginia. Each article in the next four sections will attest to the relationships that the independent variables of the current study have on educational achievement and discuss limitations in using these variables as predictors of educational outcomes. The final two research articles pertain to determining on-time educational attainment rates, which is the dependent variable used in the current study as the measure of educational achievement.

Per Pupil Expenditures

Ram (2004) conducted a study using state-level panel data by estimating a simple achievement function in the fixed-effects format to examine the effects of educational spending on student achievement. Ram began his study by citing previous research that supported and refuted the idea that educational spending was related to achievement. The researcher stated that the goal of this study was to "make a modest addition to the existing empirical evidence" (p. 170). Ram's methodology consisted of obtaining data from one reporting source and establishing a lag time for comparing a possible relationship. Ram obtained state averages for verbal and mathematics SAT scores as well as the percentages of graduates taking the SAT through the Digest of Education Statistics (U.S. Department of Education, various years). The researcher also used figures from the same source to obtain the average per pupil expenditures per state. In order to allow for lag time, the researcher compared SAT scores from one year with expenditures from the previous year. Ram correlated the expenditures from 1994-1995 with the expenditures from

the previous seven years and the results ranged from .92 to 1.00. Therefore, he concluded that the expenditure for the proceeding year was a reasonable approximation to a weighted average of expenditures for the previous eight to ten years.

After explaining his methodology, Ram (2004) addressed several limitations to his study. First, there was the possibility that a sizeable cost-of-living variation existed across the states. Ram also acknowledged that other factors such as levels of parental schooling, teachers unions, teacher certifications, and percentage of African Americans among test takers could affect testing outcomes. The researcher recognized that using state averages could mean overlooking intrastate dispersions in funding. Ram's final limitation was that his study did not account for any private school students who were taking the SAT.

Ram's (2004) findings yielded several points regarding the independent variable of per pupil expenditures and the dependent variables of verbal SAT; math SAT, and overall SAT scores. (1) Large amounts of variance could be accounted for in the regression analysis (adjusted R^2 =.98). (2) The selectivity variable, the percentage of graduates taking the SAT, had a declining negative relation with scores. (3) Expenditures (t=4.47) showed a statistically significant positive relation with mathematics (p<.05). (4) Expenditures relationship to verbal scores (t=.29) was positive but statistically insignificant. (5) The relationship between expenditures and SAT total scores were significant (p<.05), despite the findings of insignificance for verbal scores (t=.29). (6) Correlation between math and verbal scores was .96. (7) Despite statistical significance of expenditures and math, the effect size (t=4.47) appears to be quantitatively modest.

Ram (2004) concluded that the effect of expenditures on achievement carried a high statistical significance (p<.05). The researcher also stated that the estimated effect of expenditures is larger on math scores than on verbal scores. Finally, Ram reasoned that the preliminary results indicated that expenditure is more likely to have a larger effect in high achievement scenarios, where students scored better on the SAT, than in low achievement scenarios, where students scored lower on the SAT test.

Elliott (1998) conducted a similar study to measure the relationships between per pupil expenditures and student achievement. Elliot's research centered on finding a possible relationship between the allocation of public school funds and students' achievement through opportunities to learn (OTL), which is defined as resources that enhance student achievement, as measured by their performance on the 10th grade math and science tests. The researcher cited

three research questions to guide her study: "First, do educational expenditures affect students' achievement? Second, what components of the OTL program affect math and science achievement? Third, if funds are allocated for the critical components of OTL, do students learn more?" (p. 223). Elliot established two hypotheses for her study. The first was the teaching-effectiveness hypothesis, which stated that per-pupil expenditures increase student achievement if the funds go toward hiring the most qualified teachers and provide them with professional development opportunities in math and science. The second, the classroom-resources hypothesis, stated that per-pupil expenditures increase student achievement when funds are used to make equipment such as computers and microscopes more readily available for student use. In her conceptual model of the two hypotheses, Elliot gave equal credence to per-pupil expenditures and school/student controls with regards to teacher effectiveness and classroom resources. The research questions were used to test the researcher's hypotheses.

Elliot (1998) obtained her data from the National Education Longitudinal Survey and the Annual U.S. Census Bureau Survey of Local Government Finances for School Systems. The National Education Longitudinal Survey (NELS:88) was an ongoing survey conducted by the U.S. Department of Education, which polled 8th grade students, their teachers, school administrators, and the students' parents on classroom and school level educational processes every two years. The data taken from the census survey included a breakdown of public school expenditures at the school district level in the categories of absolute level of spending and the proportion of funds spent on other areas such as instruction costs, teachers' salaries, and staff development.

Elliot (1998) took her sample of 14,868 public school students from the NELS:88 survey which included interviews from the same people in 1988 and 1990. The researcher drew her sub-samples from the students who were currently taking math (97 percent) and science (93 percent) or from those who had science teachers (42 percent) or math teachers (46 percent) that had been interviewed. Elliot assumed that the results for the sample were applicable to all U.S. public high school students who took 10th grade math or science in 1990. Elliot used a math sample size of 6,318 and a science sample of 5,343 who all had valid data on the dependent variable.

Elliot (1998) used the 10th grade math or science item response theory theta score as the dependent variable and developed a system of accounting for any missing data that were encountered. First, she substituted the mean value of a given variable when data were missing.

Second, she constructed a dummy variable that corresponded to each independent variable with missing data. Elliot claimed that this process maintained a sample representative of the population and eliminated bias.

Elliott (1998) used five areas of measurement in her study. First, student outcome was measured in terms of the item response theory (IRT) theta scores, which is a mathematical transformation of the standardized test score that is designed to reflect change over time. Second, student-level controls were measured in terms of socioeconomic status, racial background, and gender. Third, school expenditures were measured as per-pupil expenditures at the school district level. Fourth, school-level controls included the school administrator's report of school composition, size, and urban/rural classification. Fifth, OTL within the 10^{th} grade math or science classroom was measured by teacher's level of education and experience.

Elliott's (1998) methods included a hierarchical linear modeling to estimate student achievement. Math and science achievement scores were estimated with a series of equations where variable sets were added in sequence with regards to (1) eighth-grade achievement and student-level controls, (2) expenditures and school level controls, (3) teachers' qualifications and class size, and (4) teaching emphases and classroom resources. The hierarchical linear model was used to control for the possible clustering of students with similar characteristics into the same schools as well as providing the opportunity to look at cross level effects.

Elliott (1998) reported several findings. The measure of expenditures was between $3,300-$3,400 per pupil on average. Approximately 20% of the students were attending urban high schools rather than suburban or rural. The average school size in the study was 1,200 students. Approximately 20% of the students studied were receiving free or reduced price lunches. Special education students accounted for 9% of the students in the study. The math and science teachers had a bachelor's degree and fifteen years of experience on average. The average class size was 23 students.

Elliot (1998) also conducted a bivariate correlation among per pupil expenditures and all other variables and among 10^{th} grade test scores and all other variables. The correlations indicated that expenditures are significantly related ($p<.05$) to student achievement. Students' SES and expenditures were positively related among math and science students. Minority students and expenditures had a positive relationship with math and a negative relation to science. The researcher found that expenditures correlated with measures of the OTL, $r=.37$.

Elliot (1998) concluded that there are several ways in which financial expenditures are being used effectively in public high schools. The findings of her study indicated that math and science were strongly affected by the amount of money that was spent on teaching practices and classroom resources. The author also concluded that in regard to science, the results supported her teaching effectiveness and classroom-resources hypotheses and verified that the way money is spent affects classroom practices. Elliot admitted that the implications of her research for educational policy are not clear since there is not a single national data set containing measures of school finance nor is there a consistent system of measurement for classroom effects.

Ilon and Normore (2006) utilized a three-stage process to evaluate the cost effectiveness of school expenditures in the state of Florida. First, the researchers conducted a multiple regression analysis to determine the effects of the various inputs that make up school expenditures. Second, Ilon and Normore conducted a cost analysis on each expenditure input. Third, they conducted a comparative analysis of the results of their cost analyses.

Ilon and Normore (2006) selected Florida for their study because the state had enacted a policy to restrict class sizes and they wished to determine if this was an effective use of public education expenditures. The researchers cited conflicting literature regarding the relationship between class size and student achievement as well as conflicting studies regarding expenditures and achievement. The researchers also mentioned several problems caused by increasing expenditures for class size reductions- hiring more teachers means less money for teacher raises, additional classrooms need to be constructed to accommodate the added teachers, and additional costs to recruit and train the new teachers.

Ilon and Normore (2006) obtained their data from the 2001-2002 Florida Indicators Report for their study. The researchers identified and used the following variables from the datasets: Florida Comprehensive Assessment Tests (FCAT) scores for grades 3-5 were the dependent variable while percentage of low income students, percentage of non-white students, percentage of administrators, percentage of instructional staff, charter schools, expenditures per student, school size, percentage of teachers with advanced degrees, teachers' average years of experience, average class size, and teachers per aide K-3 were the independent variables. The researchers identified a goal of determining which of the input, or independent, variables, was the most cost effective way to raise student achievement scores on the FCAT assessment.

In the first analysis of their study, Ilon and Normore (2006) conducted a regression analysis, which showed that all of the variables were statistically significant at ($p< .05$) and they accounted for a large amount of variance ($R^2 =.88$). The researchers cited that their most surprising result of the regression analysis was that student expenditures were negatively related to the FCAT scores. Ilon and Normore attributed this fact to expenditures per student were evaluated after the expenditures associated with teacher qualifications and classroom size had been accounted for in the analysis.

In the simulation analysis, Ilon and Normore (2006) looked at how much of each input variable would be needed to raise the test scores by 2%. The researchers determined that lowering the percentage of low-income students by 3% and lowering student expenditures by $577 could accomplish the 2% raise in test scores. The other variables would need the following changes to raise scores 2% on the FCAT assessments: Lowering the percentage of non-white students by 20%, increasing the number of administrators by .9%, increasing the number of instructional staff by 6%, decreasing school size by 350 students, increasing the number of teachers with advanced degrees by 42%, and decreasing the average class size by 2.5 students.

In the cost analysis, Ilon and Normore (2006) determined a projected cost per school for each variable that it would take to raise the standardized test scores by 2%. The results of this analysis are: Percentage of administrators- $16, 284, percentage of instructional staff- $124,672, expenditure per student- -$577, percentage of teachers with advanced degrees- $121,050, and average class size- $139,359. The researchers maintain that these results should be used only to guide investments for schools as individual schools will not respond to changes in a like manner.

The research of Ram (2004) and Elliot (1998) implied that per-pupil expenditures can have a significant effect on student achievement. Ilon and Normore (2006) also found a significant relationship between per pupil expenditure and achievement; however their results indicate that the relationship is negative. The current study of the Appalachian and non-Appalachian school divisions of Virginia identified which variable or variables possess the ability to predict the outcome when on-time educational attainment is used as the measure of student achievement. The second independent variable of the current study, which has also been found to have a strong relationship with student achievement, is attendance.

Attendance

Lamdin (1999) developed a correlation matrix and conducted a regression analysis to support his hypothesis that attendance should be considered as a legitimate independent variable when studying input-output functions of student achievement. Regarding his review of the literature on this topic, the researcher stated, "One potential policy variable that receives scant attention in this literature is student attendance" (p. 155). Lamdin was only able to cite one previous study (Caldas, 1993) which had determined that attendance was significantly related to achievement. The researcher attributed the lack of consideration for attendance to the fact that attendance shares a high correlation to socioeconomic status therefore causing researchers to omit attendance to prevent collinearity. Lamdin also cited two primary findings from previous studies which he planned to test with his anlyses: First, student input variables such as parent's education level, socioeconomic status, and ability significantly impact student achievement. Second, school input variables such as teacher/pupil ratios, per pupil expenditures, and teacher qualifications do not significantly impact achievement.

Lamdin (1999) utilized data from the 1990 Baltimore Citizens Planning and Housing Association Report as well as data from the Baltimore School District. The measure used as the dependent variable for student achievement in the study was performance on the California Achievement Test (CAT) in the spring of 1989. Lamdin used the student input independent variables of the percentage of students who did not qualify for free or reduced lunch as the socioeconomic indicator, percentage of non-white students, and attendance rates. The researcher used school input independent variables of teacher/pupil ratio, professional staff/pupil ratio, and operating expenditures per pupil.

Lamdin (1999) noted several important findings in his correlation analyses. First, negative correlation existed between each of the school input variables and student attendance: teacher pupil ratio correlated at -.38, professional/pupil ratio correlated at -.32, expenditure per pupil correlated at -.50 and the percentage of minority students correlated at -.11. Second, a positive correlation of .54 existed between attendance rates and socioeconomic status. Third, the researcher identified a positive correlation of between reading and math scores of different grades within the same schools but she did not report these results in the correlation matrix.

In his regression analysis, Lamdin (1999) found that all relationships between attendance and achievement were significant ($p<.01$ and $p<.05$). The researcher also found that all

relationships between SES and student achievement were significant ($p < .01$). Lamdin stated that "no serious collinearity problem" (p. 158) existed in this study. In his examination of the output elasticity, the researcher found that attendance had a statistically significant relationship with test scores in that a 5% increase in the attendance rate would likely result in an 8.1% increase in reading scores.

Lamdin (1999) concluded his study by asserting that attendance rates are strongly related to student achievement. His results also indicated that his findings regarding the impact socioeconomic status on achievement were consistent with other studies. Finally, he concluded that his study supported his earlier premise that student input factors significantly impacted achievement while school input factors did not have a significant impact. Lamdin (1999) closed by recommending that school divisions improve achievement by investing in improving attendance but should only do so if a cost effective program is available that will actually increase student attendance rates.

Roby (2004) conducted a study to determine the strength of the relationship between student attendance and student achievement. The researcher examined data from schools in Ohio that housed fourth, sixth, ninth, and twelfth grades since these were the grades that were tested using standardized achievement tests. Roby compared the overall schools' attendance average with students' scores on these standardized tests to determine if a positive correlation existed using the following four research questions to guide his study: (1) Does a significant positive relationship exist between student attendance and achievement as measured by the Ohio Proficiency Tests? (2) Does a statistically significant difference exist between student achievement of the top ten percent and bottom ten percent when ranked by all tests passed at the fourth, sixth, ninth, and twelfth grade levels? (3) Does a statistically significant difference exist for student attendance averages between the top ten percent and bottom ten percent as measured by all tests passed in the fourth, sixth, ninth, and twelfth grades on the Ohio Proficiency Tests? (4) Does a statistically significant difference exist in student achievement between large urban district schools when ranked by highest and lowest attendance categories?

Roby's (2004) methodology included analyzing the relationship between attendance and achievement by utilizing the Pearson's *r* correlation statistic. The researcher established the Pearson's *r* correlation for fourth grade test averages and building attendance averages, sixth grade test averages and building attendance averages, ninth grade test averages and building

attendance averages, and twelfth grade test averages and building attendance averages. Roby used the coefficient of determination (r^2) to account for common variance in the correlations. The researcher obtained all data from the Ohio Department of Education website and based his findings on 1999 data. The sample consisted of a total of 3,171 schools with 1,946 schools housing a fourth grade, 1,292 schools housing a sixth grade, 711 schools housing a ninth grade, and 691 schools housing a twelfth grade.

In regards to the first research question, Roby (2004) found a positive relationship between student achievement and student attendance for the fourth (r=.57), sixth (r=.54), and twelfth (r=.55) grade tests. The ninth grade (r=.78) was shown to have the largest positive correlation between attendance and test scores. Variance was accounted for at the following levels: fourth grade (r^2 =.32), sixth grade (r^2=.29), ninth grade (r^2=.60), and twelfth grade (r^2=.29).

In regards to the second research question, Roby (2004) found a statistically significant difference within the Ohio school systems between the top ten percent and the bottom ten percent of school rankings, based on scores from the Ohio Proficiency Tests, in the comparison of student achievement at the fourth, sixth, and ninth grade levels. The researcher calculated this using a one-tailed t test using (p<.05). The fourth grade comparison indicated a large difference (t=9.70). The sixth grade comparisons were statistically significant t=2.19, p<.05. The ninth grade comparisons were statistically significant t=6.32, p<.05. Roby did not present the degrees of freedom in his findings.

Roby (2004) found that the answer to his third research question was that a statistically significant difference existed in student attendance at the fourth, sixth, and twelfth grades between the top 10% and the bottom 10% of the school systems in Ohio. Using .05 as the level of significance, the researcher found the fourth grade level (t=7.12), the sixth grade level (t=3.16), and the twelfth grade level (t=5.68) to all be significant. The ninth grade differences were not statistically significant.

In answering the fourth research question Roby (2004) found that in four of the six largest urban school districts that a statistically significant difference between attendance and achievement was present within the top and bottom three schools of each district. Using .05 as the level of significance, Roby found Cincinnati's district

(*t*= -12.23), Dayton (*t*= -11.10), Akron (*t*= -7.18), and Toledo (*t*= -20.41) to be significant. The two districts that did not prove significant were Cleveland (t=2.27) and Columbus (t=2.50).

Roby (2004) concluded that a statistically significant relationship existed between student achievement and attendance at the fourth, sixth, ninth, and twelfth grade levels in Ohio. The strength of this relationship was classified as strong with the highest correlation of .78 being in the ninth grade. The researcher suggested that additional research be completed to determine the opinions of school personnel regarding the causes of absenteeism and to determine if a difference exists between larger and smaller schools. Roby stated that other factors, such as socioeconomic status, should also be considered when examining student attendance and achievement.

The New York City Board of Education (NYCBOE) (2000) produced a research report to determine the extent that student attendance, teacher certification, and teacher attendance were related to student achievement. The NYCBOE used a multiple regression analysis to determine the amount of variance that could be explained by student attendance, teacher certification, and teacher attendance with regards to student performance on reading and math tests for grades 3-7.

The NYCBOE (2000) conducted separate multiple regression analyses for elementary and middle school reading scores as well as elementary and middle school math scores. The researchers used the percentage of students receiving free or reduced lunch, the percentage of students identified as English language learners, and the percentage of special education students as the categories of student demographics. Student attendance was defined as the percentage of days present. Teacher attendance was defined "as the average number of days that teachers were absent" (p. 4). Certified teacher rates were determined by using the percentage of teachers who were fully certified during the 1999-2000 school year.

The NYCBOE (2000) determined that student attendance and teacher certification were significantly related to performance on the math and reading tests at the elementary and middle school levels. Student attendance was found to account for 13.9% of the variance while teacher certification accounted for 2.1%. Teacher attendance was not found to have any significant relationship with student achievement.

Lamdin (1999) established the importance of considering attendance rates as an independent variable when studying student achievement. Roby (2004) and the NYCBOE (2000) found that student attendance does have a significant relationship with student achievement when student achievement is measured as performance on standardized tests. The NYCBOE also

concluded that attendance, when combined with teacher certification and student demographics, accounted for 82.5% of the variance of reading and math scores. Roby and the NYCBOE similarly acknowledged the importance of considering other factors such as the percentage of English Language Learners (ELL) and socioeconomic status when evaluating relationships to student achievement.

Socioeconomic Status

Caldas and Bankston (1997) conducted a regression analysis to determine the relationship between the socioeconomic status of peers and student academic achievement for individual students. The researchers cited previous research studies, primarily Coleman (1966; 1980), on the SES-Achievement relationship but stated that theirs was slightly different in that it examined peer SES influence on achievement. Caldas and Bankston posed the research question "to what extent does the socioeconomic status of one's peer environment in school exert an independent influence on student achievement, regardless of the student's own individual social status?" (p. 269).

Caldas and Bankston (1997) developed four distinct hypotheses in regards to their study. First, poverty status was negatively related to academic achievement. Second, parental education and occupations were positively related to academic achievement. Third, the poverty status of the peer population was negatively related to academic achievement. Fourth, the average education and occupation levels of the peer parent groups were positively related to academic achievement.

Caldas and Bankston (1997) utilized several variables to conduct their study. The dependent variable consisted of the 1990 student scores on the Louisiana Graduation Exit Examination (GEE), which included curriculum referenced tests in mathematics, English, writing, science, and social studies that had to be passed by high school students as a requirement for graduation. In order to control for race, the researchers only used scores from students who had reported their race to be either Black or White. Special education students were also excluded from this study since they often had separate testing conditions. Caldas and Bankston identified the independent variables as family poverty status, family social status, peer family poverty status, peer family social status, and race.

The researchers utilized an Ordinary Least Squares regression in four steps to show the relationship of each independent variable to student achievement. Step one involved regressing

achievement on all independent variables. Step two involved the inclusion of the school level poverty status. In step three the family social status variable was introduced. Step four involved using race as an independent variable.

Caldas and Bankston (1997) found that the strongest correlation (r=.606) existed between individual and school level variables in the area of race. The second strongest correlation (r=.475) existed with low SES students indicating that poor students were likely to attend schools with poor students. Individual family social status and peer family social status correlated at a moderately high level (r=.331). In the cross variable analyses, individual family poverty rates and individual minority race correlated strongly (r=.529) while the school level poverty status and the school's percentage of Black students correlated at an even higher rate (r=.792).

The researchers concluded socioeconomic status does have a strong correlation with student achievement and that, when controlling for all other variables, African-American students' achievement levels fall below those of White students. Caldas and Bankston (1997) stated that their hypotheses were correct in that "a combination of school and individual student SES, apart from race and other factors, has a powerful influence on academic achievement" (p. 274). The researchers advocated the advantages of diversifying educational opportunities for students from poorer backgrounds and cautioned educators to not incorporate stereotype vulnerability (Steele, 1995), lowered expectations based on dealing with a disadvantaged population, into their schools.

Toutkoushian and Curtis (2005) conducted a study to determine the impact of socioeconomic factors on student outcomes within public high schools in New Hampshire. The authors cited numerous other studies, such as Fowler and Walberg (1991) and Jaggia and Tuerck (2000), in which socioeconomic variables had been shown to correlate highly with student achievement. Toutkoushian and Curtis reasoned that studies such as theirs were necessary in order for educators to gain a better knowledge about how factors, over which they have no control, impact student achievement and therefore become a reflection on the schools and districts where they work.

Toutkoushian and Curtis (2005) utilized data for all 73 public high schools in New Hampshire, choosing to ignore private schools since their tuition rates would likely screen out students from lower socioeconomic backgrounds. The academic years covered in their study

include 1998-1999, 1999-2000, and 2000-2001. Toutkoushian and Curtis chose the following five dependent variables to be used in their study: (1) Mean scaled scores on the 10th grade English New Hampshire Educational Improvement and Assessment Program (NHEIAP) tests, (2) mean scores on the 10th grade Math NHEIAP test, (3) the average proportion of seniors who attended a four year college or university following graduation, (4) the average proportion of graduating seniors who attended any type of postsecondary education, and (5) the average proportion of students who took the Scholastic Aptitude Test. The three independent variables were: (1) the unemployment rate for the school district, (2) the percentage of adults who had obtained at least a bachelor's degree and were living in the district in 1999, and (3) the percentage of students in each district who received free or reduced price lunches.

Toutkoushian's and Curtis' (2005) methodology included an initial examination of the correlations between outcome and input measures. The researchers discovered that the five dependent variables correlated positively with each other ranging from +0.55 to +0.87 and that each correlation was statistically significant ($p<.01$). The correlations among the three independent (socioeconomic) variables determined that communities with higher percentages of college graduates had lower rates of unemployment and lower percentages of students receiving free and reduced lunches.

Toutkoushian and Curtis (2005) proceeded by estimating multivariate models that explained how the three independent variables affected the five dependent variables. The parameters of the mean math and mean English scores were estimated with the ordinary least squares. The parameters of the other three dependent variables, because they were limited by definition to be between 0% and 100%, were estimated using a truncated regression model, which means that values were estimated so that they would fall within the 0-100 limits.

Toutkoushian and Curtis (2005) addressed the issue as to why high school graduation rates were not used as a dependent variable in their study. The researchers cited previous research, which demonstrated that schools with higher dropout rates were likely to have higher standardized test scores since most students who drop out of school are the ones most likely to fail these tests. Toutkoushian and Curtis tested this hypothesis with the data from New Hampshire and they found the opposite to be true because the student achievement measures actually declined as the dropout rates increased.

Toutkoushian and Curtis (2005) found that the three independent variables-unemployment rates, adult education levels, and parental income – accounted for over 50% of the variation on the average standardized test scores (R^2 =.53) for math and (R^2 =.53) for English. More variation was accounted for in regards to the relationship between the socioeconomic variables and the percentage of students who attended a four year college or university (R^2 =.56) and the percentage of students who took the SAT (R^2 =.56) . Variation for students attending any type of post secondary education (R^2 = .38) was slightly less than the other dependent variables.

Toutkoushian and Curtis (2005) identified five points for discussion regarding the findings of his study. First, it would be unfair to give all credit or blame to high schools for the outcomes of their students since high school is just the final stage of a K-12 education. Second, the researchers' analyses examined just a few educational outcomes that were measurable and available for research and stated that their results may not be an accurate reflection of the bigger picture. Third, factors other than socioeconomic ones that are beyond the school's control should also be considered such as students with limited English proficiency. Fourth, Toutkoushian and Curtis stated that their study did not account for approximately 40% of the variation in student outcomes and that this 40% might be attributed to factors that are within the schools' control such as curriculum and quality of instruction. Finally, the authors indicated that since socioeconomic factors change slowly, any changes in student outcomes would likely be limited. In the following article, researchers examine the influence of the relationship between socioeconomic status and student achievement on school accreditation.

Leonard and Box (2009) conducted a correlation analysis to determine the relationship between student socioeconomic status and school accreditation. The researchers cited the fact that Mississippi is the state with the highest poverty rate in the nation as the reason to conduct this study using Mississippi's data. The researchers also cited several studies, which left open the debate as to the strength of the relationship between SES and student achievement but concluded that there was consistent evidence to indicate that a relationship does exist. In their methodology, Leonard and Box utilized the percentage of students receiving free or reduced price lunch as their SES indicator. School accreditation is based on a five level scale with level one being the lowest performing schools and level five being the highest performing. Accreditation levels were based on each school's performance on the Mississippi Curriculum Test (MCT) and the Mississippi Subject Area Testing Program (SATP). Data were utilized from the 2004-2005,

2005-2006, and 2006-2007 school years. The researchers ran the correlation analysis using the state accreditation ranking for each school each year and the percentage of students receiving free or reduced lunches.

Leonard and Box (2009) found that a significant inverse relationship ($p<.01$) existed between SES and school accreditation. The schools with the highest accreditation ratings had lower percentages of students receiving free or reduced price lunches. The correlation for FY 2005 was –0.515, FY 2006 was –0.501, and FY 2007 was –0.623.

Leonard and Box (2009) concluded Mississippi's funding formula, while attempting to fund all schools to achieve level III, successful status, does not do enough to help schools with the highest percentages of students living in poverty. The researchers recommend that the state of Mississippi consider the underachievement of the low socioeconomic students when they design, implement, and evaluate educational programs. Leonard and Box also conceded that there are no short term solutions to address the issues caused by students coming from low SES homes but stated that officially recognizing the differing challenges of educating these students will help to create more equity in funding.

The previous three variables discussed in this chapter: per-pupil expenditures, attendance rates, and socioeconomic status are ones over which the schools and school divisions in Virginia have very limited or no control. The next variable, teacher qualification, is one that can be somewhat controlled by school administrators. The passage of the No Child Left Behind Act of 2002 placed a particular emphasis for school divisions to hire highly qualified teachers especially in subject areas where high-stakes accountability tests were taking place.

Teacher Qualifications

Darling-Hammond, Holzman, Gatlin, and Heilig (2005) conducted a reconstructed study based on Raymond, Fletcher, and Luque's (2001) study for the Hoover Institution's CREDO center to determine the relationship between teacher certification obtained through the Teach for America (TFA) program and student achievement. Raymond, Fletcher, and Luque had found that TFA recruits were as effective as other teachers with similar teaching experience. The researchers expanded on Raymond, Fletcher, and Luque's study by adding a comparison to teachers who were certified through standard teacher preparation programs, covering a greater number of years, and establishing more control variables.

Darling-Hammond, Holzman, Gatlin, and Heilig (2005) compiled a data set from the Houston Independent School District (HISD) using teacher certification information for teachers of grades 3-5, Texas Assessment of Academic Skills (TAAS) in reading and math, the Stanford Achievement Test- 9th Edition (SAT-9) scores for reading and math, and the Aprenda, which is a Spanish language test. All data were from the school years 1995-1996 through 2001-2002. The researchers limited their study to elementary students since elementary classes utilized the same teacher for all core subject areas. Darling-Hammond, Holzman, Gatlin, and Heilig established student prior achievement, student demographic characteristics, teacher's years of experience and highest degree completed, socioeconomic make-up of the school, and school level demographics as their control variables. Levels of teacher certification used were standard, alternative, emergency, certified out-of-field, certified with no test, uncertified, and certification code missing. The TFA teachers were classified as uncertified or alternatively certified until they completed the licensure program and then were classified as having a standard certification.

In conducting their analyses, Darling-Hammond, Holzman, Gatlin, and Heilig (2005) first ran "a series of descriptive analyses of the characteristics of students and teachers and examined the distribution of teachers to students of different kinds" (p. 10). The researchers then performed ordinary least squares regression analyses of the teacher certification levels (predictor variables) on the six types of student test scores. The researchers controlled for previous test scores, student demographics, language status, teaching experience, teacher degree levels, and average class sizes.

In their descriptive analyses, Darling-Hammond, Holzman, Gatlin, and Heilig (2005) reported that the average percentage of uncertified teachers in Houston during the years of this study ranged from 33%-50%. The researchers found that the TFA teachers were more likely to hold standard certification and positively impact student achievement during the early years of the study but noted that the data represented a decline in both areas during the later years. The researchers found that teachers without standard certification were more likely to be teaching minority students and in low socioeconomic schools. The disparity actually increased during the years of this study from 1% to 15% with regards to teaching minorities and from 2% to 11% with regards to teaching in low socioeconomic schools. Darling-Hammond, Holzman, Gatlin, and Heilig also noted that the attrition rates for the TFA teachers were about twice that of the traditionally certified teachers.

In their OLS analyses, Darling-Hammond, Holzman, Gatlin, and Heilig (2005) found that the TFA uncertified teachers and other non-certified teachers had a significant negative association ($p<.10$) with student achievement in five of the six testing categories. The TAAS math test was the only exception. Teachers without certification or with alternative certifications had lower rates of association with raising student test scores in 22 of 36 estimates. The researchers found the relationship with certification to be greater than the relationship with years of experience. Darling-Hammond, Holzman, Gatlin, and Heilig found that using non-certified teachers slowed student progress by .2 month to 1.5 months per year, depending on which test was being examined. The researchers did find that TFA teachers who had gained full certification were as associated with achieving higher test scores as were the traditionally certified teachers.

Darling-Hammond, Holzman, Gatlin, and Heilig (2005) concluded their study with a discussion on the educational limitations of utilizing teachers who do not complete a traditional teacher licensure program. The researchers stressed the negative aspects of utilizing alternative licensed teachers such as high turn-over rates and low impact on achievement during the non-certified years while conceding that these types of programs are the only way that some school divisions, primarily poor inner-city ones, can provide their students with any type of stability in the classroom. The researchers stated that while school divisions have been good about creating the alternative programs for teaching licensure, they generally have not done enough to support and retain these individuals.

Clotfelter, Ladd, and Vigdor (2007) conducted a cross-subject analysis with student fixed effects to determine the possible relationship between teacher credentials and student achievement in high schools. The researchers utilized standardized test data and teacher licensing information from North Carolina to conduct their study. The stated goal was to determine if the relationship between teacher credentials and student achievement was strong enough to be policy relevant. In the literature review, the researchers cited several studies which they considered to be flawed because the teacher certification data was self-identified and not consistent across various states. The researchers also claimed that another fault with previous studies was the lack of control for bias that results from the non-random sorting of teachers and students. Finally, Clotfelter, Ladd, and Vigdor stated while there are current studies regarding the teacher

qualification-student achievement relationship at the elementary school level, most research at the high school level was somewhat dated.

Clotfelter, Ladd, and Vigdor (2007) chose to use the available data from North Carolina for several reasons. North Carolina had a long history of utilizing a standard course of study at the high school level and student mastery of these standards had been measured with an end-of-course test (EOC). These end-of-course tests were designed to measure student knowledge taken from the curriculum and are not minimum standards tests, which the authors cited as a flaw with most states' standardized tests. North Carolina also makes available a plethora of data on teacher licensure such as highest education level, years of experience, Praxis II scores, and multiple certification areas.

Clotfelter, Ladd, and Vigdor (2007) addressed the issue of bias caused when students and teachers are not randomly assigned to classrooms by utilizing longitudinal data such as test scores in a particular subject over multiple years. Using these multiple measures allowed the researchers to statistically control for "unobservable time-invariant characteristics of students, such as their ability or motivation, that could be correlated with teacher credentials" (p.9).

Clotfelter, Ladd, and Vigdor (2007) utilized four cohorts of tenth graders – 1999-2000, 2000-2001, 2001-2002, and 2002-2003. The researchers chose to use only the end-of-course tests from the 9^{th} and 10^{th} grade curriculum which were algebra I, English, biology, economics, and geometry in order prevent high school dropouts and students taking advanced courses from confounding the study. The relative ability of the students in these cohorts was measured by the difference between their eighth grade math and eighth grade reading scores. Establishing this measure allowed the researchers to work with the null hypothesis that there was "no relationship between the student's relative ability in math and reading and the relative qualifications of her high school algebra and English teachers" (p. 14).

The first area of teacher credentials that was examined in relation to student achievement was years of experience. This measure was taken from the number of years of teaching credit awarded by the state to determine a teachers' rate of pay. Clotfelter, Ladd, and Vigdor (2007) stated that in elementary school studies, teaching credentials had the strongest effect during the early years of teaching. Clotfelter, Ladd, and Vigdor found that, with regards to years of experience of high school teachers, most gains in achievement occur during the first two years of teaching a particular subject with an effect size of .0503. The researchers concluded that novice

teachers were less effective than experienced teachers but that experience mattered less after the first two years.

The second area of teacher credentials used in Clotfelter, Ladd, and Vigdor's (2007) study was the teachers' Praxis II scores. The researchers stated that previous research had shown Praxis II scores to be one of the most statistically significant predictors of student achievement. The researchers normalized these scores for each year of administration based on means and standard deviations from the test scores of all teachers used in their data sets. Clotfelter, Ladd, and Vigdor utilized a control variable for each subject to indicate that a particular teacher had no test score for that subject. The researchers found the strongest relationship in math with "one standard deviation difference in a teacher's math test score is associated on average with a 0.03 standard deviation difference in student achievement in either algebra or geometry" (p. 23). Teacher test scores in biology were predictive of student achievement on the EOC test but the coefficients were smaller than those on the math tests. The signs were negative for English and economics. The researchers attributed this to the possibility that the licensure tests in social studies and English were broad and not specifically related to the course material. Clotfelter, Ladd, and Vigdor found that teachers without a reported Praxis II score were slightly less effective than those with a test score.

The third area of teacher credentials studied by Clotfelter, Ladd, and Vigdor (2007) was licensure type and certification by subject. North Carolina has divided their licensure types into three categories: (1) regular, (2) lateral entry which is North Carolina's alternative licensure program, and (3) other. The researchers found that achievement was highest when teachers with regular licenses taught courses. Student achievement was reduced by approximately .06 standard deviations when lateral entry teachers taught their courses. However, lateral entry teachers who had gone on to obtain a regular license appeared to be as closely associated as their regularly licensed counterparts to higher test scores. Teachers licensed in the other category, which included provisional and emergency certificates, were associated with a negative achievement effect of -.0466.

The fourth area of teacher credentialing used by the researchers in their study was National Board Certification. Clotfelter, Ladd, and Vigdor (2007) found that teachers who had either begun or completed the process to become Nationally Board Certified had a higher statistically significant relationship with student achievement than teachers who were not

Nationally Board Certified. This finding was not evident on an earlier study of National Board Certified teachers at the elementary level, which had been completed by these same researchers (Clotfelter, Ladd, & Vigdor, 2006).

Clotfelter, Ladd, and Vigdor (2007) used teacher education as the final area of teacher credentialing included in their study. The researchers found there to be a small positive effect for students taught by teachers with a master's degree. The researchers also noted a large negative effect on student achievement for teachers who had a Ph. D. Clotfelter, Ladd, and Vigdor attributed this negative effect to the small number of teachers included in the sample who had obtained this level of certification. The researchers noted that in regards to master's degrees, the strongest effect on student achievement was evident for teachers who had obtained their master's degrees after they began teaching. Teachers, who entered the profession having already earned a master's degree, had similar relationships with student achievement as teachers with a bachelor's degree.

Clotfelter, Ladd, and Vigdor (2007) concluded that teachers with less experience and without regular certification had the largest negative effect on student achievement. These teachers with weak credentials would fall at the 10^{th} percentile of student achievement while teachers with the strongest credentials would be in the 90^{th} percentile of student achievement. The implications for students are that a student with a weak credentialed teacher could expect to score .18 standard deviations lower on the North Carolina EOC tests than a student taught by a teacher with strong credentials.

The researchers also utilized their data to examine other variable relationships. The researchers found that student achievement was higher in small classrooms although the effect, with a coefficient of -0.0026, was small in that achievement was increased by .0125 standard deviations in classes with five fewer students. Clotfelter, Ladd, and Vigdor (2007) also determined that there were large negative coefficients when classes were taught by Black teachers (-0.0592) and by male teachers (-0.0566). The researchers indicated that the poorer performances in classes taught by Black teachers were attributable to the lower scores of White students in these classrooms. The lower scores in classes taught by male teachers could be attributed to the negative interaction between these male teachers and the female students.

Clotfelter, Ladd, and Vigdor (2007) concluded their study by stating that "teacher credentials matter in a systematic way for student achievement at the high school level and that

the magnitudes are large enough to be policy relevant" (p. 34). The researchers estimated that the standard deviation in student achievement that could be attributed to teacher credentials is around plus or minus .075. Clotfelter, Ladd, and Vigdor cautioned policy makers to not put so much emphasis on teacher credentials that they overlook important characteristics that can only be seen in the classroom. However, the authors closed by restating that there should be a serious concern by policy makers as to the evident predictability of teacher credentials toward student achievement. In the next study, a researcher examines the relationship between No Child Left Behind (NCLB) legislation credentialing standards and student achievement.

Klecker (2008) conducted a regression analysis to determine if the teacher quality traits emphasized by NCLB legislation were significantly linked to student performance, specifically on eighth-grade mathematics tests. In her review of the literature, the researcher cited several studies that indicated teacher certification as being strongly linked to student achievement but also cited one of her own previous studies that found no significant relationship between teacher certification and student performance on fourth-grade reading scores in Kentucky. Klecker also cited Clotfelter, Ladd, and Vigdor's (2007) finding that the strongest relationship between teacher certification and achievement was in math as a reason to perform this type of study.

In her methodology, Klecker (2008) obtained data from the National Assessment of Education Progress (NAEP), which began including NCLB teacher quality variables in 2005. The researcher used major/minor in mathematics, highest academic degree, types of teaching certificates, and years of experience as her independent variables. Student scores on the 2007 8th grade NAEP math tests was the dependent variable. Klecker (2008) found that math teachers with a major (d=0.25) or a minor (d=0.27) in mathematics to have stronger positive relationships with student achievement than teachers with neither (d=0.09). The researcher found that with regard to the highest academic degree, having an associate/vocational certificate (d=1.20), Bachelor's degree (d=0.14), and Master's degree (d=0.14) were significant (p<.01) while high school diploma, Educational Specialist, and Doctoral degrees were not significant. Klecker found emergency licensed teachers with no teaching certification (d=0.71) to be more effective than emergency licensed teachers with temporary (d=0.23), provisional (d=0.39), and probationary (d=.57) certifications. The researcher also found that the most effective teachers, with regards to years of experience were those with 20+ year of teaching experience (d=.37) with 0-4 years of that experience being in math.

Klecker (2008) concluded that each area of teacher qualification examined in this study was significant ($p<.01$) with varying effect sizes. The researcher also established that based on her data, the most effective math teacher would have over 20 years of experience, possess a professional degree, hold a regular/standard teaching certificate, and have either a minor or major in mathematics. Klecker conceded that some of the results from this study were "puzzling" (p.10), such as large effect size of teachers who possess only an Associate Degree/Vocational Certification, and may require additional research.

The researchers cited in the preceding four sections found that per pupil expenditures, attendance rates, socioeconomic status, and teacher qualifications had statistically significant relationships with student achievement. The current study determined possible predictive ability of each of these variables to student achievement using on-time educational attainment as the achievement indicator. The following studies on high school graduation rates will explain problems with inconsistencies between states and school divisions in determining on-time educational attainment rates as well as introduce the procedure, which will be used in modified form, to compute the on-time educational attainment percentage in the current study.

On-Time Educational Attainment

Barton (2009) constructed a report for the Educational Testing Service (ETS) that was to fulfill five purposes with regards to high school graduation rates. The first purpose was to highlight current problems and inconsistencies with determining high school graduation rates. The second purpose was to give suggestions for improving "the point-in-time data on high school students" (p. 4). The third purpose was to review the longitudinal tracking approach recommended by the National Governors Association. The fourth purpose was to highlight the implications of using high school graduation data in an accountability system. The fifth purpose was to assess present uses of high school graduation rates and to identify how these uses have changed over the past four decades.

Barton (2009) presented information about how the U.S. Census Bureau has recently switched their method of calculating high school graduation rates from the Current Population Survey (CPS) to the American Community Survey (ACS). Two reasons for this switch were because the ACS had a greater ability to provide information on smaller, regional, areas of the country and it covered more of the U.S. population. CPS data were discontinued for use by the U.S. Census Bureau because of several problems that included the reporting of high school

graduation rates that were higher than actual numbers and reporting smaller gaps between minorities and Whites than were actually present.

Barton (2009) cited several other studies that confirmed the CPS data were flawed and had over exaggerated high school graduation numbers in the U.S. One of the most prominent of these studies was conducted by Heckman and La Fontaine (2007). Heckman and La Fontaine concluded that: (1) The actual high school graduation rate has been lower than the reported rates. (2) The high school graduation rate has been declining over the past forty years. (3) The gaps in graduation rates between minorities and Whites have not improved over the past thirty five years. (4) There is a decline in the native population within the U.S. as well as lower graduation rates caused by an increase in immigrants. (5) Drops in college attendance can be attributed to declining high school graduation rates. (6) A gender gap between males and females also exists which explains some of the disparity between the increased percentage of females and decreased percentage of males entering college.

Barton (2009) also cited problems that existed with the CPS method for calculating graduation rates as well as problems with the newer ACS method. The most prominent of these problems is that data are collected during phone polls from one person who answers questions about everyone in the household. Often this person does not have complete knowledge and will make guesses about others in the household. There are also issues with the poll respondent not understanding differences between a GED, certificate of attendance, and a high school diploma. Another prevalent issue is the question construction. One question simply asks for the highest level of educational attainment. Since many community colleges accept people whom did not graduate from high school, the answer that they have had some college gets them counted as a high school graduate even though they may not have graduated. Barton also stated that he has not been able to find any field studies that would validate the questions and answers of the phone polls that were used by CPS and ACS.

Barton (2009) stated that the issues pertaining to the U.S. Census Bureau's calculations of high school graduation rates were that they used the number of 17 year olds in a population and the number of high school diplomas as reported by each state's education department. The problem with using the number of 17 year olds in the equation is that people get their diplomas at different ages. The problem with using the number of diplomas by state is that each state

reported this differently and used different standards for determining what counts as a high school graduate. This led to the unreliable rates being calculated and presented.

Barton (2009) presented alternate methods of calculating high school graduation rates that were being conducted by prominent researchers including Greene (no reference provided) and Swanson and Chaplin (no references provided). These three researchers focused on developing formulas based on Common Core of Data (CCD) reports which provided graduation rates that were based on receiving a high school diploma within four years of entering high school. Greene (no reference provide) and Swanson and Chaplin (no reference provided) presented findings of graduation rates that were consistently lower than those reported by states and by the U.S. Census Bureau.

Barton (2009) reported that the findings of Greene (no reference provide) and Swanson and Chaplin (no reference provided) along with the need to obtain better state level data to meet the requirements of No Child Left Behind led to the development of two task forces to propose a more consistent means for calculating high school graduation rates. The first task force was created by the National Institute of Statistical Science and the other was created by the National Governor's Association (NGA). Both task forces recommended using a longitudinal tracking system that includes following students over periods of years to determine on-time graduation rates.

The methods developed to track high school students over time differed somewhat in how the denominator in the graduation equation was determined. The National Institute for Statistical Science task force recommended using straight ninth grade enrollment numbers. The problem with this method is the trend, during the past twenty years, for a large percentage of ninth graders to be retained each year causing inflated ninth grade enrollment numbers, which has been termed as the ninth grade bulge or ninth grade bubble. This ninth grade bulge tends to create lower on-time graduation rates and more erratic graduation trends between states and regions. Another method, developed by Greene (no reference provided), was to average the eighth, ninth, and tenth grade enrollment numbers for each graduation cohort in an attempt to balance out the inflated ninth grade enrollment numbers. The third method, used by Heckman and La Fontaine (2007), was to use eighth grade enrollment numbers. The problem with this method was that in many states a large number of students attended private schools through the eighth grade before enrolling in public high schools. This caused a lower denominator to be used

in the graduation equation which inflated the graduation rate. According to Barton, the National Center for Educational Statistics adopted a formula based on Greene's method which they termed the Averaged Freshman Graduation Rate (AFGR).

Barton (2009) made several suggestions about how data could be better collected and utilized to present a more accurate on-time graduation rate. First, schools would need to report a statistic on the number of new ninth graders who enter each year in order to eliminate the sometimes inflated ninth grade average. Second, have states report students by the number of years they have been in high school rather than by the class identifiers of freshmen, sophomores, juniors, and seniors. Third, include data about students who have transferred schools after beginning high school. Fourth, identify diplomas by type. Fifth, ensure that data collected on gender, race, and ethnicity can be disaggregated. Requiring all states to present the exact same data would eliminate many of the inconsistencies that have been present in previous graduation rate calculations.

Barton (2009) presented information, which implied that the longitudinal tracking systems favored by the NCES and NGA had deficiencies that needed to be addressed. Problems with tracking students over time include maintaining accurate records, analyzing data, and accounting for students who fall out of the tracking system. Several states have tried to implement and improve their longitudinal tracking systems by creating student identifiers that allow data to be gathered on students who transfer schools. Sixteen states now have student-tracking systems but there still is not a program that allows for the tracking of students who move from one state to another during high school.

According to Barton (2009), the most significant problem with tracking students is how to account for students who fall out of the tracking systems. Texas, for example, in 2006 had 65,877 students who had left school but were not counted as dropouts. Numerous reasons were listed for them leaving school including home schooling, removal by Child Protective Services, transferring to private schools, moving to another state, expulsions, or being found to be non-residents. Eliminating these students from the numerator and denominator of the graduation equation for Texas leads to the calculation of a questionable graduation rate.

Barton (2009) provided some of the history behind using high school graduation rates as a means of accountability for schools and school systems. NCLB legislation has been the driving force behind high stakes accountability and established one component of accountability as the

ability for schools to graduate high school students within four years. The expectations of NCLB became even more demanding when the Secretary of Education, Margaret Spellings, announced in 2008 that all states would use a uniform method for calculating graduation rates by the 2012-2013 school year.

Barton (2009) stated that a better reason for looking at graduation rates than fear of NCLB sanctions is so schools can increase the number of students who graduate. The author discussed the importance of considering reasons students do not graduate from high school and called into question the logic behind punishing schools who graduate students in five years instead of four. Barton cited a 2002 study from the U.S. General Accounting Office, which listed the two types of factors for students dropping out of school- family issues and school experiences. These types of factors include such problems as low-socioeconomic status, absenteeism, being retained two or more grades, frequent moving, pregnancy, and whether or not the student comes from a two-parent family.

Barton (2009) stated that a method should be developed that measures a school on what it is doing to attain the "best possible graduation rate" (p. 22) instead of a universal method of judging schools based on graduation rates that do not take into account problems associated with various student body compositions. The author cites Europe's certification programs, as an example of what the United States should aspire to implement. Instead of being judged on time limits, students in Europe are allowed to choose from a variety of pathways and can remain in school until they obtain some type of certification.

Barton (2009) summarizes his research by making five concluding points. The first point is that an accurate national graduation rate has yet to be produced as evidenced by the varying rates presented from the NCES and the U.S. Census Bureau. Second, the best method for calculating state graduation rates is the use of the Averaged Freshman Graduation Rate, which accounts for the inflated ninth grade retentions. Third, tracking students over long periods of time is a difficult task and no state thus far has been able to develop an effective method for doing this. Fourth, any type of standard accountability will not be a fair measure of what schools are accomplishing since each school is defined by a unique student population which is affected by previous school and life experiences. Fifth, high school graduation rates are only as good as the quality of the infrastructure that provides the data.

The previous research article mentioned several prominent researchers of on-time graduation rates. It also mentioned several methods for determining these graduation rates. The next study to be reviewed was conducted by Greene and Winters (2006) and will provide more information about the formulas that are included in the current study to determine the rates for on-time educational attainment.

Greene and Winters (2006) conducted a study of high school graduation in the United States using a standardized method of calculation for the graduating class of 2003. The authors initiated this study because of the lack of uniformity across the country in computing high school graduation rates and as a response to the call from 45 state governors in 2005 to develop a "standardized calculation of the four-year high school graduation rate" (p.1). Their formula has since been adopted by the National Center for Educational Statistics as the best method for determining on-time educational attainment.

Greene and Winters' formula for calculating graduation rates at the national/state level was to divide the total diplomas handed out in the spring of 2003 by the estimated number of students who entered the ninth grade in 1999 while making adjustments for population shifts. Taking an average of eighth grade students in 1998, ninth grade students in 1999, and tenth grade students in 2000 computed the estimated number of ninth grade students in 1999. Calculating ninth grade enrollment this way helped to smooth out the large number of ninth graders who were held back each year. The formula for calculating a population shift at the national/ state levels was implemented by taking the number of 17-year olds in the summer of 2002 as provided by the U.S. Census Bureau, determining the difference between this number and the number of 14 year olds in 1999, dividing the difference by the number of 14 year olds in 1999, and applying the percentage change to the number of ninth grade students in 1999 to get an adjusted number for diplomas that should have been issued in the spring of 2003. The method for obtaining data was altered slightly when making computations for individual school districts. Instead of using figures from the U.S. Census Bureau, enrollment numbers were obtained from a particular school district and adjustments were made based on changes in student enrollment during the time period being studied.

Using these procedures, Greene and Winters (2006) calculated a national graduation rate of 70% for the class of 2003. The rates varied widely based on race with White students graduating at a rate of 78%, Asian students at 72%, African-American students at 55%, and

Hispanic students at 53%. They also discovered some disparity based on gender with the female graduation rate at 72% while the male rate was at 65%. All of the nation's ten largest school districts had graduation rates below 60%. Virginia's overall graduation rate in 2003, as shown in Figure 3, was 75% with Asians having an 80% rate, African-Americans a 67% rate, and Whites a 78% rate.

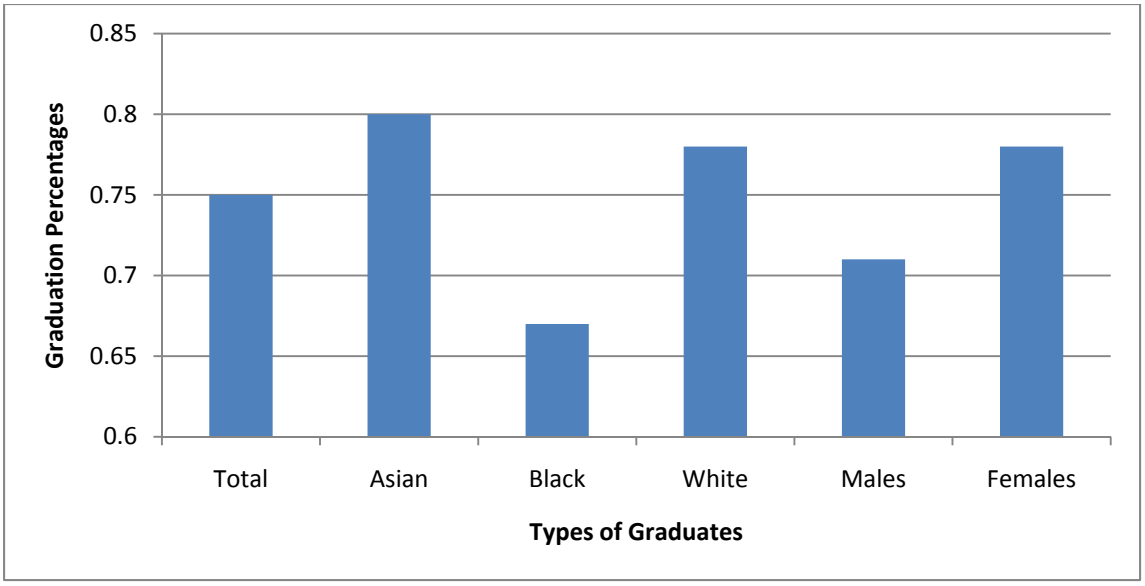

Figure 3. 2003 Virginia High School Graduation Rates (Greene & Winters, 2006).

Green and Winters (2006) concluded by emphasizing that 30% of the U.S. population does not graduate from high school and identified the issue of gender disparity as deserving additional research. The researchers also included a statement about how the primary concern should center around the 100 largest school districts in the country, since they seem to drag the overall rate down. In closing, there were no suggestions about how to improve the situation but instead a warning that the country must focus on improving schools in large urban areas if the situation is to improve.

Conclusion

Educational opportunities and programs in Appalachia have developed at a slower rate than in the rest of the United States (DeYoung & McKenzie, 1992). Measurable progress with regards to educational attainment and economical development only began to be noticed during the final decades of the twentieth century (Haaga, 2004). Despite this progress, parts of Appalachia remain mired in the cycle of poverty caused by a lack of economic development and

an outward migration of its skilled workforce (Black, Mather, & Sanders, 2007). The regions' ability to increase its return in human capital depends on the success of its schools systems (De Sousa & Gebremedhin, 1999). These school systems will need to ensure they are producing quality graduates on par with other regions of the country if economic conditions in Appalachia are to reach a level of stabilized competitiveness in the global market (De Sousa & Gebremedhin, 1999).

The four independent variables and one dependent variable included in the review of the literature allow numerous possibilities for conducting the type of comparative analysis that is the basis for the current study. Per pupil expenditures, attendance rates, socioeconomic status, and teacher qualifications have each been shown to have a significant relationship with student achievement (Ram, 2004; Lamdin, 1999; Leonard & Box, 2009, Clotfelter, Ladd, & Vigdor, 2007). The current study utilized on-time educational attainment as the measure of achievement for Virginia and will be computed using formulas that are applied consistently to every school division in the state. The formula utilized by Greene and Winters (2006) allowed for uniform application across the state, accounted for the ninth grade bubble, took into account various diploma types, and adjusted for population shifts. The other formula that was used in the current study allowed for uniform application across the state, took into account various diploma types, adjusted for population shifts, and used straight ninth grade enrollment numbers rather than controlling for the ninth grade bubble.

Previous research indicated that the Appalachian school divisions in Virginia may be at a disadvantage in regards to resources (per pupil expenditures and qualified teachers) and family constraints (socioeconomic status and attendance rates). These disadvantages could have a negative relationship to student achievement. Establishing the predicting ability of these independent variables for on-time educational attainment and investigating how the Appalachian school divisions compare to the non-Appalachian school divisions with regard each of these variables could be beneficial for educators and community leaders who have an interest in improving conditions in the region.

Although there have been numerous research studies conducted on each of the five variables included in the current study, there has been little research reported within the Appalachian region using these five variables. The current study establishes Virginia as a point of reference for future researchers who wish to examine similar relationships within different

regions of individual states. The current study also reduces the void in the literature on how Appalachian schools in the twenty-first century are measuring up to their non-Appalachian counterparts.

CHAPTER III
METHODOLOGY

Introduction

The current study had two primary purposes. The first purpose was to examine the possible predicting abilities of socioeconomic status, per pupil expenditures, percentage of highly qualified teachers, and attendance rates with on-time educational attainment in the state of Virginia. The second purpose was to compare Appalachian school divisions of Virginia with the non-Appalachian school divisions for each of these variables. The methodology used to accomplish these purposes is discussed in this chapter. Chapter III is divided into four sections which include a description of the research design, data sources, data collection and analysis, and a summary.

Research Design

In regards to the first purpose of the current study, several analyses were conducted on the collected data. A stepwise multiple regression analysis was conducted in SPSS using on-time educational attainment as the dependent variable with socioeconomic status, attendance rates, per pupil expenditures, and teacher qualification as the independent variables. On-time educational attainment was determined using a method that accounted for the ninth grade bubble for each cohort included in the current study. The stepwise method of multiple regression was utilized so each predictor variable could be correlated with the outcome while controlling for the effects of the other predictor variables (Field, 2005). Casewise diagnostics were performed in order to obtain the observed and predicted values of the outcome along with residual statistics. The results of collinearity diagnostics were examined to assess the assumption that there was not an existence of multicollinearity between any of the predictor variables (Field, 2005). The assumptions of the model were checked with a plot of ZRESID against ZPRED also known as a scatter plot, a histogram, and a normal probability plot of the residuals (Field, 2005). ZRESID represent the standardized residuals while ZPRED represents the standardized predicted values.

Regarding the second purpose, data were collected for each of the five variables and reported in the following fashion:

1. Per pupil expenditures were listed for the ninth grade year of each graduation cohort included in the current study (see Appendix B). The comparative analyses were

conducted using a general linear model repeated measures analysis of variance (ANOVA) and results were analyzed to compare the Appalachian school divisions to the non-Appalachian school divisions of similar size (below 9,999), the non-Appalachian large school divisions (at or above 10,000), and the total non-Appalachian school divisions.

2. Attendance rates were determined for each school division's secondary schools by dividing the average daily attendance in secondary schools by the average daily membership in secondary schools (see Appendix C). Every school divisions' attendance rate from the ninth grade year was used for all graduating cohorts. The comparative analyses were conducted using a general linear model repeated measures ANOVA and results were analyzed to compare the Appalachian school divisions to the non-Appalachian school divisions of similar size, the non-Appalachian large school divisions, and the total non-Appalachian school divisions.
3. The percentage of students falling into the low socioeconomic status category (see Appendix D) was determined for each school division by dividing the number of students receiving free or reduced priced lunches by the total student population. The school divisions' averages for each graduation cohort's ninth grade year were used. The comparative analyses were conducted using a general linear model repeated measures ANOVA and results were analyzed to compare the Appalachian school divisions to the non-Appalachian school divisions of similar size, the non-Appalachian large school divisions, and the total non-Appalachian school divisions.
4. The teacher qualifications variable (see Appendix E) was listed using the percentage of highly qualified teachers reported for each school division on the Virginia State School Division Report Cards for the ninth grade year of each graduating cohort with the exception of the Class of 2005. Since the No Child Left Behind legislation was not passed until this class' ninth grade year, the reporting of teachers as highly qualified did not occur until the following year. Therefore, the reported percentages for 2002-2003 (tenth grade year) were used as the teacher qualification rate for the class of 2005. The comparative analyses were conducted using a general linear model repeated measures ANOVA and results were analyzed to compare the Appalachian school divisions to the non-Appalachian school

divisions of similar size, the non-Appalachian large school divisions, and the non-Appalachian school divisions as a whole.

5. On-time educational attainment rates that account for the ninth grade bubble (see Appendix F) and on-time educational attainment rates that do not account for the ninth grade bubble (see Appendix G) were determined using a four-step process. First, a population adjustment percentage was created by taking the total number of students in each school division during a cohort's eighth grade year and dividing it by the total number of students in each school division during each cohort's graduation year. Second, in order to account for the ninth grade bubble, which is caused by the large number of ninth graders who are retained each year, a ninth grade enrollment figure was established by averaging the enrollment numbers for each cohort's eighth grade, ninth grade, and tenth grade years. The second step for determining rates that do not account for the ninth grade bubble was to use the exact enrollment numbers reported for the ninth grade year of each graduating cohort. Third, the ninth grade enrollment figure was multiplied by the population adjustment to determine the number of students who should have received a diploma in each graduating cohort. Finally, the total number of students who received an advanced diploma, standard diploma, modified standard diploma, special diploma, or completed school through the school divisions' Individual Student Alternative Education Plan (I.S.A.E.P.) was divided by the number of students who should have finished with each cohort to determine the rate of on-time educational attainment. The comparative analyses were conducted using a general linear model repeated measures ANOVA and results were analyzed to compare the Appalachian school divisions to the non-Appalachian school divisions of similar size, the non-Appalachian large school divisions, and the total non-Appalachian school divisions.

Data Sources

All data used in the current study were collected from the Virginia Department of Education. Per-pupil expenditures were taken from Table 15 of the Superintendents Annual Report (Virginia Department of Education, n.d.d) for each cohort's ninth grade year, which included 2001-2002, 2002-2003, 2003-2004, and 2004-2005. Attendance rates were taken from

Table 8 of the Superintendents Annual Report (Virginia Department of Education, n.d.d) for each cohort's ninth grade year. Free and reduced priced lunch rates were taken from the Free and Reduced Price Lunch Program Eligibility Reports (Virginia Department of Education, n.d.c) by School Year for each cohort's ninth grade year. Each school divisions' percentage of highly qualified teachers for the years of 2002-2005 was obtained by request from Patty Pitts, Assistant Superintendent for Teacher Education and Licensure for the Virginia Department of Education (P. Pitts, personal communication, July 30, 2009). The data used to create the population shift percentages and cohort enrollment numbers, which were used in determining the rates for on-time educational attainment, were taken from the enrollment numbers listed on the Fall Membership Report (Virginia Department of Education, n.d.a) which identified the number of students enrolled in each school division on September 30th of each school year. The number of students graduating each school year was taken from the High School Graduates & Completers report (Virginia Department of Education, n.d.b) for each graduation year covered in the current study.

Data Collection and Analysis

All data were collected and entered on Microsoft Excel spreadsheets for each school division used in the current study. Per pupil expenditure, attendance rates, socioeconomic status, teacher qualification, and on-time educational attainment data for all graduating cohorts covered in the current study were copied and pasted to SPSS where the stepwise multiple regression analysis was performed. The comparative analyses were also conducted in SPSS. All charts and graphs, found in the appendixes, pertaining to these correlation and regression analyses were produced in SPSS.

Data from three school systems were excluded from the current study. All data from Fairfax City Schools and Lexington City Schools were not used because they were incomplete for various years of the current study. The 2008 data from Amherst County Schools were not used because the number of high school completers was larger than the number of seniors enrolled for the 2007-2008 school year.

Summary

The current study involved an extensive collection of data pertaining to Virginia's graduating cohorts of 2005, 2006, 2007, and 2008. These data were used to determine the

predictive ability of per pupil expenditures, attendance rates, socioeconomic status, and teacher qualifications for on-time educational attainment rates. The data collected to perform these analyses were also used to compare the Appalachian school divisions to the non-Appalachian school divisions of similar size, the non-Appalachian large school divisions, and the total non-Appalachian school divisions. All analyses and comparisons were conducted using SPSS and Microsoft Excel.

CHAPTER IV
PRESENTATION AND ANALYSIS OF DATA

Introduction

In this chapter the analyses of the collected data and the statistical techniques utilized for the current study are presented in three sections. Section one is entitled Variable Relationships and in this section correlation and multiple regression analyses are reported that address the first research question described in Chapter III. Section two contains the description of the comparative analyses which addressed the second, third, and fourth research questions detailed in Chapter III relative to per pupil expenditures, attendance rates, socioeconomic status, teacher qualifications, and on-time educational attainment. Section three is a summary of the findings.

Variable Relationships

Research Question 1

The variable relationships described in this section will address the first research question which was: Which, if any, of the independent variables of socioeconomic status, percentages of highly qualified teachers, attendance rates, and per pupil expenditures predict the dependent variable of on-time educational attainment in the state of Virginia?

The current study utilized a stepwise multiple regression analysis to provide the correlations between variables, to determine the significance of the relationships between variables, and to establish whether or not any of the four independent variables posses the ability to predict on-time educational attainment rates. Multiple regressions were chosen over separate simple regression analyses in order to find "the linear combination of predictors that correlate maximally with the outcome variable" (Field, 2005, p. 116). The stepwise method was utilized as the primary method of regression analysis in order to remove independent variables that did not make a significant contribution to the ability of the model to predict the outcome variable (Field, 2005). An α (alpha) value of .01 was used as the level of significance. Although the APA format requires numbers to be carried out to only hundredths place, it was determined that the data used in the current study would be a better representation for comparison if carried out beyond two decimal places (T. Creighton, personal communication, January 2010). This decision was made based on the numerical significance of thousandths place over hundredths place when considering a variable, such as attendance rates, that involves millions of students attending

schools for 180 days per year. An example of this would be that in Fairfax County Schools alone, it would take 10,000 absences to move the attendance rate .1%.

The regression analyses were based on on-time educational attainment rates that account for the ninth grade bubble as the dependent variable. The same analyses were also performed utilizing the method that counted straight ninth grade enrollment numbers in calculating the on-time educational attainment rates. Both methods produced similar effect sizes. The bubble method was selected for use in this variable relationships section because it accounted for 1.2% more variance. The school district classification comparisons from both formulas are presented in the Comparative Analysis section of Chapter IV with the mean on-time educational attainment rates for each school division classification listed in Table 4.

Descriptive statistics for all variables.

The descriptive statistics, displayed in Table 2, provide the means and standard deviations for each of the four independent variables and the dependent variable used in the current study. The correlation statistics presented in Table 3 provide the correlation and significance level for each independent variable and on-time educational attainment. Correlations were examined as a check for possible collinearity between independent variables. It is worth noting that SES and attendance rates correlated higher with each other than either did with on-time educational attainment. The relationship between these two independent variables was examined more closely in the collinearity subsection of Chapter IV.

Table 2

Descriptive Statistics for All Variables

	Mean	Std. Deviation	N
OEA	.819	.09107	523
PPE	$7,561.02	$1,383.18	523
Attendance	.9369	.01687	523
SES	.3762	.15986	523
TQ	.8633	.10737	523

Table 3

Correlation Statistics for All Variables

	On-Time Ed. Atn.	PPE	Attendance	SES	TQ
Pearson Correlation					
OEA	1.000	.054	.276*	-.338*	.193*
PPE	.054	1.000	-.021	.163*	.117*
Attendance	.276*	-.021	1.000	-.472*	.169*
SES	-.338*	.163*	-.472*	1.000	-.249*
TQ	.193*	.117*	.169*	-.249*	1.000

**-p<.01*

Stepwise regression analysis.

The stepwise multiple regression (see Appendix H) revealed a significant model for predicting on-time educational attainment, $F(520)=39.41$, $p<.01$, $R^2=.132$: OEA= .114 + (-.152* SES) + (.813*Attendance rate). The regression coefficients of the model indicated that as SES rates increased, on-time educational attainment decreased and as attendance rates increased, on-time educational attainment rates increased.

Collinearity.

Even though SES and attendance rates were found to be significantly correlated, the collinearity statistics (see Appendix H) indicated that collinearity was not a likely problem for the regression model that was obtained. The tolerance rates of .777 for SES and attendance rates indicated that collinearity was not a substantial issue. Tolerance rates below .2 indicate a potential problem while rates below .1 indicate a serious concern (Field, 2005).

Casewise diagnostics.

The casewise diagnostics (see Appendix H) identified four cases as having standardized residuals outside of + or – three standard deviations. The four cases account for .7% of the total cases. Studies where residuals account for less than 1% of the cases are considered acceptable (Field, 2005).

Check of assumptions.

Three types of data analyses were utilized to check the assumptions of independent errors for the variables that were found to be significant predictors in the regression equation and for on-time educational attainment. First, histograms (see Appendix H) of the data used in the current study indicated that there was a normal distribution within the on-time educational attainment rates, attendance rates, and SES. Ideally, variable distribution should resemble a bell shaped curve to reflect a normal distribution of residuals (Field, 2005) and this was evident for both independent variables used in the regression equation and for on-time educational attainment. Second, the normal probability plots (see Appendix H) indicated that on-time educational attainment, attendance rates, and SES had a normal distribution of residuals. Ideally, the points on a normal probability plot will form a straight line that represents a normal distribution (Field, 2005) which was what occurred for each of the variables included in the regression equation. Third, the scatter plot (see Appendix H) represents a final check of the assumptions of the model. The scatter plot indicated a random but even disbursement of points and that the assumption of linearity had been met with regards to on-time educational attainment. In conclusion, the variables of attendance rates, SES, and on-time educational attainment contain normally distributed random residuals which indicate that the assumptions of the model are reasonable.

Comparative Analysis

In the following comparative analyses, each variable used in the current study was tested using a general linear model repeated measures ANOVA to determine if significant differences existed between the 31 Appalachian school divisions and the 75 non-Appalachian divisions of similar size, the 31 Appalachian school divisions and the 25 non-Appalachian large school divisions, and the 31 Appalachian school divisions and the 100 non-Appalachian divisions as a whole for the graduating cohorts of 2005-2008. An alpha value of .05 was used to determine the level of significance. Effect sizes were measured using partial eta square (η_p^2). The results of these analyses address the second, third, and fourth research questions for per pupil expenditures, socioeconomic status, attendance rates, teacher qualifications, and on-time educational attainment.

Research Question 2

The second research question was: How do the Appalachian school divisions of Virginia compare to all of the non-Appalachian school divisions of similar size in Virginia with regard to per pupil expenditures, socioeconomic status, percentages of highly qualified teachers, attendance rates, and on-time educational attainment rates?

Per pupil expenditures.

The results of the analyses of per pupil expenditures (see Appendix I) indicated that there was a significant interaction between the school division classifications and time, $F(3, 312)=3.055$, $p<.05$, $\eta_p^2 =.029$. An examination of the line graph (see Appendix I) indicated that both classifications of school divisions increased their amounts of per pupil expenditures during each year included in the current study but the per pupil expenditures at the non-Appalachian school divisions of similar size grew at higher rate causing an increase in the disparity between the two types of divisions over time. There was also a significant difference over time for per pupil expenditures, $F(3, 312)=91.51$, $p<.05$, $\eta_p^2 =.468$. This means that the per pupil expenditures in the Appalachian and non-Appalachian divisions of similar size increased significantly during the four years covered in the current study. Finally, there was not an overall significant difference, $F(1, 104)=4.495E3$, $p>.05$, $\eta_p^2 =.016$, between the two school division classifications for the time period covered in the current study.

Socioeconomic status.

The results for socioeconomic status (see Appendix J) indicated that there was not a significant interaction between time and school division classifications, $F(3, 312)=.166$, $p>.05$, $\eta_p^2 =.004$. There was a significant difference over time, $F(3, 312)=51.207$, $p<.05$, $\eta_p^2 =.330$, meaning that the rates of students receiving free or reduced priced lunches increased significantly for both the Appalachian and non-Appalachian divisions of similar size during the four years examined in the current study. There was not a significant difference in SES rates between school division classifications, $F(1, 104)=.475$, $p>.05$, $\eta_p^2 =.004$.

Attendance rates.

The ANOVA results for attendance rates (see Appendix K) indicated that there was not a significant interaction between school division classification and time, $F(3, 312)=.817$, $p>.05$,

η_p^2 =.008. Likewise, there was not a significant difference over time for attendance rates, F(3, 312)=.231, p>.05, η_p^2 =.002. There was also not a significant difference with respect to attendance rates, F(1, 104)=2.557, p>.05, η_p^2 =.024, for the Appalachian and non-Appalachian divisions of similar size.

Teacher qualifications.

Teacher qualification rates (see Appendix L) were found to have a significant interaction between division classification and time, F(2, 208)=4.256, p<.05, η_p^2 =.039. An examination of the line graph (see Appendix L) revealed that teacher qualification rates were higher at Appalachian school divisions than non-Appalachian school divisions of similar size but over time, the disparity between the two decreased. The results indicated that there was also a significant difference over time for teacher qualification rates, F(2, 208)=183.988, p<.05, η_p^2 =.639, meaning that the teacher qualification rates grew significantly for both school division classifications during the three years examined in the current study. Finally, it was determined that there was a significant difference between school division classifications, F(1, 104)=9.968, p<.05, η_p^2 =.087. This result indicates that the Appalachian school divisions had a significantly higher percentage of its teachers deemed as highly qualified during the years examined.

On-time educational attainment rates.

Results for the on-time educational attainment rates that accounted for the ninth grade bubble (see Appendix M) indicated that there was not a significant interaction between school division classification and time, F(3, 309)=2.476, p>.05, η_p^2 =.023. There was a significant difference over time for the two classifications of school divisions, F(3, 309)=2.733, p<.05, η_p^2 =.026, meaning that the overall rates grew significantly during the years studied. There was also a significant difference between school division classifications, F(1, 103)=7.659, p<.05, η_p^2 =.068, which means that, for the time period examined, the Appalachian school divisions had on-time educational attainment rates that were significantly higher than the non-Appalachian divisions of similar size.

The results for on-time educational attainment rates that did not account for the ninth grade bubble (see Appendix N) indicated a significant interaction between school division classification and time, F(3, 309)=3.679, p<.05, η_p^2 =.034. An examination of the line graph (see Appendix N) revealed that the Appalachian school divisions' rates dropped in 2006 and 2007

before going back up in 2008 while the non-Appalachian divisions of similar size's rates grew each year included in the current study. There was also a significant difference over time, $F(3, 309)=2.753$, $p<.05$, $\eta_p^2=.026$, which indicates that generally, a significant increase in on-time educational attainment rates was observed for the years examined in the current study. Finally, there was also a significant difference between school division classifications, $F(1, 103)=13.507$, $p<.05$, $\eta_p^2=.116$, indicating that the Appalachian school divisions also had significantly higher on-time educational attainment rates when using the formula that did not account for the ninth grade bubble.

Research Question 3

The third research question was: How do the Appalachian school divisions of Virginia compare to the larger non-Appalachian school divisions of Virginia with regard to per pupil expenditures, socioeconomic status, percentages of highly qualified teachers, attendance rates, and on-time educational attainment rates?

Per pupil expenditures.

ANOVA results for PPE (see Appendix O) indicated that there was a significant interaction, $F(3, 162)=4.992$, $p<.05$, $\eta_p^2=.085$, between time and school division classification. An examination of the line graph (see Appendix O) revealed that, although both division classifications increased their per pupil expenditures during the years included in the current study, the non-Appalachian large school divisions increased at a higher rate causing an increase in the disparity between the two classifications over time. A significant, $F(3, 162)=83.715$, $p<.05$, $\eta_p^2=.608$, difference existed between the years examined in the current study. This is explained by the steady increase in per pupil expenditures from the 2001-2002 school year through the 2004-2005 school year. The results did not indicate a significant difference, $F(1, 54)=1.650$, $p>.05$, $\eta_p^2=.030$, between school division classification with respect to per pupil expenditures.

Socioeconomic status.

The results from the analyses of socioeconomic status (see Appendix P) indicated a significant interaction for SES, $F(3, 162)=3.796$, $p<.05$, $\eta_p^2=.066$, between time and school division classification for the years included in the current study. The line graph presented in

Appendix P shows that the Appalachian and the non-Appalachian large school divisions had steady increases in the percentages of their students receiving free or reduced priced lunches for each year that data were collected but the percentage in the Appalachian school divisions grew at a faster rate causing a widening disparity to exist. The ANOVA results also indicated that a significant difference over time existed for SES rates, $F(3, 162)=50.266$, $p<.05$, $\eta_p^2=.482$, which means that, for the time period examined, the rates grew significantly. Finally, the results indicated that a significant difference, $F(1, 54)=6.153$, $p<.05$, $\eta_p^2=.102$, existed between the school division classifications for SES.

Attendance rates.

The ANOVA results for attendance rates (see Appendix Q) indicated that there was not a significant interaction, $F(3, 162)=1.014$, $p>.05$, $\eta_p^2=.018$, between school division classification and time. There also was not a significant difference between the years, $F(3, 162)=.627$, $p>.05$, $\eta_p^2=.011$, for which data were collected for attendance rates. Finally, there was not a significant difference, $F(1, 54)=1.271$, $p>.05$, $\eta_p^2=.023$, between the Appalachian school divisions and the non-Appalachian large school divisions with regard to attendance rates.

Teacher qualifications.

Teacher qualification rates (see Appendix R) were not found to have a significant interaction between school division and time, $F(2, 108)=.913$, $p>.05$, $\eta_p^2=.017$. A significant difference, $F(2, 108)=160.726$, $p<.05$, $\eta_p^2=.749$, was found between the years included in the current study which indicates that the rates significantly increased from the 2002-2003 school year to the 2004-2005 school year. A significant difference did not exist between the Appalachian and non-Appalachian large school divisions for teacher qualification rates, $F(1, 54)=.105$, $p>.05$, $\eta_p^2=.002$.

On-time educational attainment rates.

The ANOVA results for on-time educational attainment rates that account for the ninth grade bubble (see Appendix S) indicated that there was not a significant interaction, $F(3, 162)=2.489$, $p>.05$, $\eta_p^2=.044$, between school division classification and time for the Appalachian and non-Appalachian large school divisions. A significant difference in on-time educational attainment rates that accounted for the ninth grade bubble did exist for the years

included in the current study, $F(3, 162)=7.482$, $p<.05$, $\eta_p^2=.122$. There was also found a significant difference between the Appalachian and non-Appalachian large school divisions, $F(1, 54)=11.325$, $p<.05$, $\eta_p^2=.173$, for the graduating cohorts of 2005, 2006, 2007, and 2008 with the Appalachian divisions having consistently higher attainment rates.

For on-time educational attainment rates that did not account for the ninth grade bubble (see Appendix T) a significant interaction was found between school division classification and time, $F(3, 162)=2.768$, $p<.05$, $\eta_p^2=.049$. An examination of the line graph in Appendix T revealed that a wide disparity existed for the class of 2005 before narrowing somewhat for the classes of 2006 and 2007 and then widening again for the class of 2008. The results indicated that a significant difference existed over time, $F(3, 162)=6.090$, $p<.05$, $\eta_p^2=.101$, which can be explained by the two year drop in the rates for the Appalachian divisions and the steady increase for the non-Appalachian large school divisions. Finally, the results also indicated that a significant difference, $F(1, 54)=14.486$, $p<.05$, $\eta_p^2=.212$, existed between the school division classifications with the Appalachian divisions being significantly higher than the non-Appalachian large school divisions.

Research Question 4

The fourth research question was: How do the Appalachian school divisions of Virginia compare to all of the non-Appalachian school divisions of Virginia with regard to per pupil expenditures, socioeconomic status, percentages of highly qualified teachers, attendance rates, and on-time educational attainment rates?

Per pupil expenditures.

The analyses for per pupil expenditures (see Appendix U) indicated that a significant interaction existed for school division classification and time, $F(3, 387)=4.141$, $p<.05$, $\eta_p^2=.031$. An examination of the line graph (see Appendix U) revealed that while the rates increased for both the Appalachian and non-Appalachian school divisions, the non-Appalachian divisions grew at a faster rate causing an increase in the disparity that existed. The ANOVA results also indicated that the differences over time for per pupil expenditures were significant, $F(3, 387)=105.438$, $p<.05$, $\eta_p^2=.450$. There was not a significant difference between the school division classifications, $F(1, 129)=1.784$, $p>.05$, $\eta_p^2=.014$, for per pupil expenditures.

Socioeconomic status.

The analyses of socioeconomic status data (see Appendix V) indicated that there was not a significant interaction between school division classification and time, $F(3, 387)=.594$, $p>.05$, $\eta_p^2=.005$. There was a significant difference over time, $F(3, 387)=57.281$, $p<.05$, $\eta_p^2=.307$, which means that the percentage of students receiving free or reduced priced lunches increased significantly during the years examined in the current study. There was not a significant difference, $F(1, 129)=1.546$, $p>.05$, $\eta_p^2=.012$, between school division classifications with regard to socioeconomic status.

Attendance rates.

The ANOVA results for attendance rates (see Appendix W) indicated that there was not a significant interaction between school division classification and time, $F(3, 387)=.736$, $p>.05$, $\eta_p^2=.006$. The results also indicated that there was not a significant, $F(3, 387)=.143$, $p>.05$, $\eta_p^2=.001$, difference between the years examined in the current study. The analyses for attendance rates also indicated that there was not a significant difference between the Appalachian and non-Appalachian school divisions, $F(1, 129)=2.443$, $p>.05$, $\eta_p^2=.019$.

Teacher qualifications.

The analyses for teacher qualification rates (see Appendix X) indicated that there was a significant interaction between school division classification and time, $F(2, 258)=3.791$, $p<.05$, $\eta_p^2=.029$. An examination of the line graph in Appendix X revealed that both division classifications grew in their percentages of highly qualified teachers but the non-Appalachian divisions were able to increase at a higher rate causing decrease the disparity that existed from the 2002-2003 to the 2004-2005 school years. The results also indicated that a significant difference over time existed for teacher qualifications, $F(2, 258)=212.730$, $p<.05$, $\eta_p^2=.623$, with more highly qualified teachers being identified over the time period studied. There was also a significant difference, $F(1, 129)=5.949$, $p<.05$, $\eta_p^2=.044$ between the Appalachian and non-Appalachian school divisions during the years examined in the current study with the Appalachian school divisions generally reporting greater percentages of highly qualified teachers than the non-Appalachian divisions.

On-time educational attainment.

The analyses of the on-time educational attainment rates that accounted for the ninth grade bubble (see Appendix Y) indicated that there was a significant interaction between time and school division classification, $F(3, 384)=2.855$, $p<.05$, $\eta_p^2=.022$. An examination of the line graph (see Appendix Y) revealed that the on-time educational attainment rates for the Appalachian school divisions dropped in 2006 and 2007 while the rates for the non-Appalachian divisions grew during each year included in the current study. The ANOVA results indicated that a significant difference over time existed for the on-time educational attainment rates that accounted for the ninth grade bubble, $F(3, 384)=4.491$, $p<.05$, $\eta_p^2=.04$. Finally, the results indicated that a significant difference, $F(1, 128)=10.115$, $p<.05$, $\eta_p^2=.073$, existed between the Appalachian and non-Appalachian divisions with the Appalachian divisions obtaining consistently higher rates during the years examined.

The ANOVA results for on-time educational attainment rates that did not account for the ninth grade bubble (see Appendix Z) indicated the existence of a significant interaction, $F(3, 384)=4.208$, $p<.05$, $\eta_p^2=.032$, between school division classification and time. The line graph for these data (see Appendix Z) revealed the same two year drop in rates for the Appalachian divisions and the same consistent ascent of rates for the non-Appalachian divisions that were found when examining the rates that accounted for the ninth grade bubble. The results also indicated the existence of a significant difference over time, $F(3, 384)=4.319$, $p<.05$, $\eta_p^2=.033$,for the on-time educational attainment rates that did not account for the bubble. Finally, there was also an indication that a significant difference existed between the Appalachian and non-Appalachian divisions for this method of calculating on-time educational attainment rates with the Appalachian divisions being consistently higher, $F(1, 128)=15.935$, $p<.05$, $\eta_p^2=.111$.

Table 4

Mean On-Time Educational Attainment Rates in Virginia- Accounting for the Ninth Grade Bubble and Using Straight Ninth Grade Enrollment Numbers

Division Classification	*2005	2005	*2006	2006	*2007	2007	*2008	2008
Appalachian	.86	.84	.85	.82	.84	.80	.87	.85
Non-App. Sim. Size	.80	.74	.81	.75	.82	.76	.82	.77
Non-App. Large	.78	.71	.81	.72	.79	.73	.82	.75
Non-App. Total	.79	.73	.80	.74	.81	.75	.82	.76

*On-time educational attainment rates that accounted for the ninth grade bubble.

Summary of Findings

The current study was conducted using 523 data entries for each of the four independent variables and one dependent variable that was calculated using two different methods resulting in over 3,000 pieces of data being examined. The first set of analyses presented in this chapter examined the predictability of the independent variables of per pupil expenditures, socioeconomic status, attendance rates, and teacher qualification for on-time educational attainment. Results from these analyses were presented in terms of descriptive statistics, stepwise regression analysis, collinearity, casewise diagnostics, and a check of the assumptions. The second set of analyses utilized general linear model repeated measures ANOVAs to compare the four independent variables and one dependent variable examined in the current study to answer the second, third, and fourth research questions. A summary of these results can be found in Table 5.

The examination of the variable relationships produced a significant model for predicting on-time educational attainment using SES and attendance. Statistics for collinearity appeared to be within the allowable limits as did the statistics for residuals. The probability plots indicated a normal distribution of residuals for SES, attendance rates, and on-time educational attainment rates which were the variables used in the regression equation.

Table 5

Summary Table for ANOVAs

Dependent Variable	ANOVA	App. Vs. NASS	App. Vs. NAL	App. Vs. NA Total	Explanation
PPE	Interaction	*	*	*	Widening disparity
	Time	*	*	*	
	School Div.				
SES	Interaction		*		Increases over time
	Time	*	*	*	
	School Div.		*		
Attendance	Interaction				No significance
	Time				
	School Div.				
TQ	Interaction	*		*	Increases over time
	Time	*	*	*	
	School Div.	*		*	
OEA Acc.	Interaction			*	App. Drop non-App. increased
	Time	*	*	*	
	School Div.	*	*	*	
OEA Not	Interaction	*	*	*	App. Drop non-App. increased
	Time	*	*	*	
	School Div.	*	*	*	

*-Significant ($p<.05$)

Abbreviations: App.- Appalachian; NASS-non-Appalachian of Similar Size; NAL- non-Appalachian large; NA Total- non-Appalachian total; PPE- per pupil expenditures; SES- socioeconomic status; TQ- teacher qualification rates; OEA Acc.- On-time educational attainment rates accounting for the ninth grade bubble; OEA Not- On-time educational attainment rates that do not account for the ninth grade bubble.

The independent variable of per pupil expenditures revealed two points of interest. First, per pupil expenditures significantly increased, during the years examined, for each school division classification that was studied. However, the per pupil expenditures for all of the non-Appalachian division classifications grew at a higher rate than the Appalachian divisions causing a widening in the disparity of expenditures. Second, the non-Appalachian large school divisions had significantly higher per pupil expenditure rates than the Appalachian school divisions for the school years of 2001-2002 through 2004-2005.

The ANOVA results for socioeconomic status indicated that there was a significant growth in the number of students receiving free or reduced priced lunches over time for all of the school division classifications included in the current study. The growth was most notable when comparing the Appalachian and the non-Appalachian large school divisions since the disparity gap between the two widened significantly from 2002 to 2005. These two division classifications were also found to be significantly different during the timeframe examined.

Attendance rates were not found to have any significant interactions between time and division classification. They were also not found to be significantly different over time and there was not a significant difference between any of the division classifications that were examined.

Teacher qualification rates were found to have a significant interaction between time and division classification for each of the Appalachian and non-Appalachian comparisons that were included in the current study. These rates also proved to significantly increase over time for the three years of data that were examined. The Appalachian school divisions were found to have a significantly higher percentage of highly qualified teachers than the non-Appalachian divisions of similar size. The significance of the difference between these two classifications likely led to the significant difference between the Appalachian and total non-Appalachian divisions since the the differences between the Appalachian and non-Appalachian large school divisions were not found to be significant.

The analyses of on-time educational attainment rates yielded several results that are of importance to the current study. First, when accounting for the ninth grade bubble, there was not a significant interaction between time and division classification when comparing the Appalachian divisions to the non-Appalachian divisions of similar size and the non-Appalachian large school divisions but there was a significant interaction when comparing the Appalachian to the total non-Appalachian divisions. Second, when not accounting for the ninth grade bubble, a significant interaction between time and division classification occurred in all three comparisons of the Appalachian and non-Appalachian school divisions. Third, both methods of calculating on-time educational attainment rates produced results that were found to be significantly different over time for each of the classifications included in the current study. Finally, all six comparisons between the Appalachian school divisions and the non-Appalachian divisions yielded results that showed the Appalachian divisions having significantly higher on-time educational attainment rates.

The data presented in this chapter will be examined more closely and more thoroughly interpreted in Chapter V. The interpretation of the data will allow for a discussion of the implications generated through the current research. Following a presentation of the implications, additional research questions will be identified based information that was not provided in the current study.

CHAPTER V
SUMMARY AND IMPLICATIONS

Introduction

The purpose of this chapter is to summarize the current study and present the implications of the findings based on the data that were presented in Chapter IV. This chapter will also provide a means for the researcher to interpret and explain the findings and to make suggestions for additional research about the predictability of variables other than socioeconomic status, attendance rates, per pupil expenditures, and teacher qualifications for on-time educational attainment in the state of Virginia. In addition to the variable relationship recommendations, the researcher makes recommendations for future studies comparing data between Appalachian and non-Appalachian school divisions.

Summary of the Current Study

The findings presented in Chapter IV came from analyses performed on data obtained from the Virginia Department of Education website (Virginia Department of Education, n.d.a,b,c,& d). The independent variables used in the current study, were selected based on previous research that was presented in Chapter II, which had found each independent variable to be significantly related to student achievement (Clotfelter, Ladd, & Vigdor, 2007; Lamdin, 1999; Leonard & Box, 2009; Ram, 2004). The purposes of the analyses were to determine whether on-time educational attainment rates in the state of Virginia could be predicted by socioeconomic status, per pupil expenditures, percentage of highly qualified teachers, and attendance rates and to compare the Virginia Appalachian school divisions with the non-Appalachian school divisions of Virginia for each of these variables. On-time educational attainment rates were computed using one method of accounting for the ninth grade bubble and another method of using straight ninth grade enrollment numbers. All findings represent the school divisions in the state of Virginia and may not be applicable to Appalachian and non-Appalachian school districts in other states.

The stepwise multiple regression results presented in Chapter IV were used to answer the first research question of the current study. Stepwise was chosen as the method of regression in an effort to best determine the ability of the independent variables to predict the outcome variable. A regression equation that resulted from the application of the stepwise procedure

incorporated two significant predictors ($p<.01$): SES and attendance rates. The mean on-time educational attainment rate of .819 is extremely close to the mean predicted rate of .8186 that was obtained through applying the regression equation to the SES and attendance data for each school division included in the current study. It should be noted that if different years were examined and/or other variables were included the outcome could be quite different.

The comparative analyses results presented in Chapter IV provided answers to the second, third, and fourth research question. Results in this section described how the Appalachian school divisions in Virginia compared to all of the non-Appalachian school divisions, the non-Appalachian school divisions of similar size, and the non-Appalachian large school divisions with regard to socioeconomic status, attendance rates, teacher qualification, per pupil expenditures and on-time educational attainment rates. A brief comparison was also made between two methods of calculating on-time educational attainment rates for the studied school division classifications.

Implications for Educational, Civic, and Business Leaders

The findings of the current study suggest several points that are pertinent to educators, civic leaders, and business leaders in Virginia and possibly the rest of the country. The results of the stepwise multiple regression analyses provide educators a means to predict on-time educational attainment rates with some expected accuracy. The comparative analyses may serve to dispel some of the negative perceptions about the Appalachian region of Virginia as well as lay the ground work for future studies that compare the public educational systems within Virginia or other states that contain Appalachian and non-Appalachian school systems. The implications of the Appalachian/non-Appalachian comparisons and the implications for various educational and professional organizations will be discussed next.

Variable Relationships

The finding that SES and attendance rates were dependable predictor variables in the regression equation is consistent with previous studies (Lamdin, 1999; Toutkoushian & Curtis, 2005) where these two variables were found to have statistically significant relationships with student achievement. The finding of per pupil expenditures and teacher qualifications not being significant predictor variables for on-time educational attainment should not diminish the importance of these variables toward our public education systems because in other studies

where student achievement is measured by different means, such as standardized test scores or college enrollment, the results may be completely different than the ones obtained in the current study.

Comparative Analyses

Several implications can be derived from the comparisons of the Appalachian and non-Appalachian school divisions. First, reports identifying the Appalachian region of Virginia as having 12%-17% fewer adults with a high school diploma or equivalent (Appalachian Regional Commission, 2004) does not mean the school systems in the region are failing to graduate their students. It appears that, at least for the years covered in the current study, the Appalachian school divisions were turning out high school completers at a statistically significant rate above the rest of the state. Second, the students in Appalachia are more likely to live in poverty than the students in the non-Appalachian counties. This statement can be supported by the consistently higher percentage of students from the Appalachian school divisions who received free or reduced priced lunches. These differences were most notable when comparing the Appalachian and non-Appalachian large school divisions where the differences were found to be statistically significant. Third, regarding highly qualified teachers, it can be said that the Appalachian school divisions are at or above the rates of the non-Appalachian divisions. This implies that the region does a reasonably good job of recruiting and retaining teachers credentialed to teach in their respective areas. Finally, the results for per pupil expenditures indicated the existence of a widening disparity between the Appalachian and non-Appalachian division classifications. The implication of this disparity is that there may be an increasingly inequitable distribution of educational funds throughout the state.

Another important implication that can be taken from the current study is the need to provide some sort of accountability for ninth grade retentions when instituting on-time educational attainment or graduation rates. When taking into account the ninth grade bubble, the differences in on-time educational attainment rates ranged from 2%-8% between the various classifications used in the study. When there was no accounting for the ninth grade bubble, these differences ranged from 4%-13%. Providing a formula that accounts for the large number of ninth grade retentions would seem to provide a more stable method of determining who completes their high school education within four years of beginning the ninth grade.

Educational and Professional Organizations

The findings of the current study are important for professional educators in Virginia including the Virginia Department of Education for two reasons. First, the results of the current study provide a somewhat reliable equation for predicting on-time educational attainment rates by using ninth grade SES numbers and ninth grade attendance rates. This equation could be applied to the ninth grade data of future graduating cohorts in Virginia to estimate how many of them will complete high school in a four year period. Second, the results identified a particular region of the state that, for four consecutive years, has been able to produce significantly higher rates of on-time educational attainment. This fact could be the basis for the Virginia Department of Education to explore regional differences in educational practices and policies which may have some influence on these higher rates.

There are also implications for other professional organizations and agencies such as the National Association of Secondary School Principals (NASSP), the American Association of School Administrators (AASA), the Appalachian Regional Commission (ARC), and college and university school administrator preparation programs. The on-time educational attainment rates in the Appalachian region of Virginia for 2005-2008 were higher than the national average and the averages determined for all of Virginia's neighboring states which were calculated using a similar formula developed by Green and Winters (2006) for the graduating classes of 2003. This should provide the ARC and administrator preparation programs with a viable reference point for researching regional differences in other states that contain Appalachian and non-Appalachian counties. The NASSP and the AASA could work to improve on-time educational attainment rates throughout the country by bringing some attention to and discussion about the successes of the Appalachian school divisions of Virginia that may lead to changes in regions that are struggling to improve in this measure of student achievement.

The implication for civic and business leaders in the Appalachian region of Virginia is simple. The Appalachian region of Virginia is producing an educated workforce which, in terms of on-time educational attainment, is above the rest of the state. The Appalachian school divisions are also able to hire and retain qualified teachers at a rate that is on par with or slightly ahead of the rest of the state. Therefore, the Appalachian region of Virginia is likely to be able to sustain an increase in business and industries that could enable its high school graduates to remain in the region without having to look elsewhere for employment.

Suggestions for Future Research

Although the findings of the current study answer many questions about how school divisions in the Appalachian region of Virginia compare to the rest of the state, they also raise awareness about a few other questions that could be the basis for additional research:

1. At what point, prior to 2005, did the Appalachian school divisions begin to obtain higher on-time educational attainment rates than the non-Appalachian divisions? If the Appalachian divisions have been consistently producing a higher percentage of on-time education completers, why does the adult population of the region continue to have a lower percentage with a high school diploma or GED than in the rest of the state? If the higher rates in Appalachia are new, what factors have led to this improvement?
2. Even though the regression equation was found to be significant for predicting on-time educational attainment rates, are there other variables that could be even better predictors? Race, education levels of parents, teacher attendance, average class size, and school accreditation are additional variables that may also possess strong relationships with and could be even prove to be better predictors for on-time educational attainment rates. It may be worth testing these additional variables for their predictive ability to on-time educational attainment.
3. Given the fact that SES correlated negatively with on-time educational attainment in the current study, how have the Appalachian school divisions been able to overcome having larger percentages of their students coming from low SES backgrounds to produce consistently higher on-time educational attainment rates?
4. What factors or changes in public school financing in Virginia led to the widening disparity of per pupil expenditures between the Appalachian and non-Appalachian school divisions?
5. How do the Appalachian divisions of Virginia compare to the non-Appalachian school division classifications with other measures of student achievement such as standardized test scores, percentage of students receiving advanced studies diplomas, or graduations from college?

Conclusion

Through a stepwise multiple regression analysis, it was determined that SES and attendance rates were significant predictor variables for on-time educational attainment rates. Per pupil expenditures and teacher qualifications were excluded from the model as not being significantly able to predict the on-time educational attainment. The collinearity and residual statistic were within acceptable limits.

The comparative analyses between independent variables used in the current study of the Appalachian and non-Appalachian school divisions provided a few points of interest. First, the Appalachian school divisions had consistent, but not statistically significant, lower per pupil expenditures than the non-Appalachian division classifications and the discrepancy between the division classifications grew at a statistically significant rate over time. Second, the Appalachian divisions had consistently higher percentages of students receiving free or reduced priced lunches with the difference being statistically significant between the Appalachian and non-Appalachian large school divisions and the rates for all division classification grew significantly over time. Third, there were no statistically significant differences over time in attendance rates between the school division classifications that were examined. Fourth, the Appalachian divisions were found to have teacher qualification rates that were significantly higher than the non-Appalachian school divisions but the differences decreased over time. This significant difference is attributable to the lower percentages of highly qualified teachers in the non-Appalachian divisions of similar size as there was no significant difference between the Appalachian and non-Appalachian large school divisions.

The comparative analyses of the on-time educational attainment rates provided the most interesting findings of the current study. The Appalachian school divisions had consistent and statistically significant higher on-time educational attainment rates than all of the non-Appalachian school division classifications that were examined. These results were found to be true with both methods of calculating the on-time educational attainment rates.

At the heart of the current study was the desire to determine how the educational factors and the achievements of students residing in the Appalachian region of Virginia compared with students living in the other parts of the state. However, overriding that desire is the imperative need for all school divisions in Virginia to continue to strive for improvement and ensure that we are turning out an educated workforce that will be able to compete in the global job market of the

21st century. Hopefully, the findings discussed here will provide some a basis for future research that will have a positive impact on educational practices and student achievement in Appalachia and throughout Virginia.

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APPENDIX A

IRB EXEMPTION LETTER

Appendix A
IRB Exemption Letter

VirginiaTech

Office of Research Compliance
Carmen T. Green, IRB Administrator
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24061
540/231-4358 Fax 540/231-0959
e-mail ctgreen@vt.edu
www.irb.vt.edu
FWA00000572(expires 1/20/2010)
IRB # is IRB00000667

DATE: September 28, 2009

MEMORANDUM

TO: Theodore Creighton
Kevin Siers

FROM: Carmen Green

SUBJECT: **IRB Exempt Approval:** "A Comparative Analysis of Appalachian and Non-Appalachian School Divisions" , IRB # 09-803

I have reviewed your request to the IRB for exemption for the above referenced project. The research falls within the exempt status. Approval is granted effective as of September 28, 2009.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in the research protocol. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.

2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

cc: File

APPENDIX B

PER PUPIL EXPENDITURES FOR THE CLASSES OF 2005-2008

Legend: 1- Appalachian, 2- Non-Appalachian of Similar Size, and 3- Non Appalachian Large School Divisions

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Accomack Co Pblc Schs	2	7,581	8,355	8,988	9,272
Albemarle Co Pblc Schs	3	8,707	9,258	9,433	10,516
Alleghany Co Pblc Schs	1	7,783	8,000	8,415	8,790
Amelia Co Pblc Schs	2	9,029	7,774	7,361	7,708
Amherst Co Pblc Schs	2	6,802	6,882	7,258	7,873
Appomattox Co Pblc Schs	2	7,160	6,645	6,948	7,636
Arlington Co Pblc Schs	3	13,451	14,717	15,977	16,984
Augusta Co Pblc Schs	3	6,472	6,869	7,144	7,677
Bath Co Pblc Schs	1	10,127	10,619	11,306	12,003
Bedford Co Pblc Schs	3	6,529	7,197	6,559	7,255
Bland Co Pblc Schs	1	7,421	7,288	7,727	8,460
Botetourt Co Pblc Schs	1	6,875	7,354	7,613	8,183
Brunswick Co Pblc Schs	2	7,979	8,499	8,623	9,951
Buchanan Co Pblc Schs	1	8,975	8,124	8,307	9,221
Buckingham Co Pblc Schs	2	7,201	7,768	7,803	8,907
Campbell Co Pblc Schs	2	6,606	6,777	7,023	7,549
Caroline Co Pblc Schs	2	6,839	7,393	7,730	7,953
Carroll Co Pblc Schs	1	7,257	7,492	7,903	8,268

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Charles City Co Pblc Schs	2	9,244	10,204	11,289	12,871
Charlotte Co Pblc Schs	2	6,996	7,130	7,485	8,123
Chesterfield Co Pblc Schs	3	6,452	6,991	7,141	7,467
Clarke Co Pblc Schs	2	7,779	7,722	8,294	8,379
Craig Co Pblc Schs	1	7,190	7,988	7,830	8,519
Culpeper Co Pblc Schs	2	6,830	6,969	7,514	7,819
Cumberland Co Pblc Schs	2	7,590	7,838	8,664	9,555
Dickenson Co Pblc Schs	1	7,540	8,106	8,560	8,589
Dinwiddie Co Pblc Schs	2	6,843	6,959	7,231	8,263
Essex Co Pblc Schs	2	7,814	7,643	7,825	8,608
Fairfax Co Pblc Schs	3	9,907	10,153	10,770	11,249
Fauquier Co Pblc Schs	2	8,351	8,386	8,601	9,248
Floyd Co Pblc Schs	1	6,970	7,405	7,358	7,944
Fluvanna Co Pblc Schs	2	7,041	7,125	7,117	7,614
Franklin Co Pblc Schs	2	6,853	7,127	7,324	8,202
Frederick Co Pblc Schs	3	7,311	7,677	8,345	8,600
Giles Co Pblc Schs	1	6,722	7,169	7,210	7,767
Gloucester Co Pblc Schs	2	6,783	7,062	7,470	8,313
Goochland Co Pblc Schs	2	8,079	8,550	8,538	8,822
Grayson Co Pblc Schs	1	7,531	7,778	7,975	8,533
Greene Co Pblc Schs	2	7,508	7,876	8,084	8,644

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Greensville Co Pblc Schs	2	7,072	7,747	8,470	9,022
Halifax Co Pblc Schs	2	7,174	7,850	8,493	9,094
Hanover Co Pblc Schs	3	6,223	6,455	6,925	7,496
Henrico Co Pblc Schs	3	6,551	7,083	7,105	7,637
Henry Co Pblc Schs	1	6,965	7,339	7,286	7,919
Highland Co Pblc Schs	1	8,768	8,352	9,481	11,081
Isle Of Wight Co Pblc Schs	2	6,879	7,067	7,706	8,070
King Geo Co Pblc Schs	2	6,845	7,107	7,178	7,084
King & Queen Co Pblc Schs	2	9,213	9,766	10,141	11,063
King William Co Pblc Schs	2	7,832	7,293	7,993	8,142
Lancaster Co Pblc Schs	2	7,967	8,036	8,543	9,131
Lee Co Pblc Schs	1	7,245	7,364	8,002	9,116
Loudoun Co Pblc Schs	3	9,318	10,159	10,344	11,246
Louisa Co Pblc Schs	2	7,251	7,573	7,705	8,363
Lunenburg Co Pblc Schs	2	7,776	7,913	8,329	8,828
Madison Co Pblc Schs	2	7,337	7,893	7,706	8,310
Mathews Co Pblc Schs	2	7,722	6,989	7,301	7,983
Mecklenburg Co Pblc Schs	2	6,407	7,106	7,551	7,793
Middlesex Co Pblc Schs	2	7,337	7,886	7,747	8,471
Montgomery Co Pblc Schs	1	7,618	7,673	7,778	8,428

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Nelson Co Pblc Schs	2	7,664	9,012	8,482	9,309
New Kent Co Pblc Schs	2	6,462	6,764	7,219	7,768
Northampton Co Pblc Schs	2	7,595	8,096	8,662	9,672
Northumberland Co Pblc Schs	2	7,455	7,630	7,967	8,696
Nottoway Co Pblc Schs	2	7,009	7,040	7,204	8,657
Orange Co Pblc Schs	2	6,759	7,424	7,581	7,767
Page Co Pblc Schs	2	6,252	6,353	7,039	7,870
Patrick Co Pblc Schs	1	6,937	6,971	7,439	7,784
Pittsylvania Co Pblc Schs	2	7,062	6,526	6,690	7,451
Powhatan Co Pblc Schs	2	7,307	7,413	7,721	8,286
Prince Edward Co Pblc Schs	2	7,273	7,300	7,629	8,655
Prince George Co Pblc Schs	2	6,709	6,996	7,077	7,717
Prince Wm Co Pblc Schs	3	7,361	7,862	8,266	8,992
Pulaski Co Pblc Schs	1	6,777	7,302	7,413	8,106
Rappahannock Co Pblc Schs	2	8,143	8,228	8,918	9,630
Richmond Co Pblc Schs	2	6,936	7,099	7,448	8,110
Roanoke Co Pblc Schs	3	7,354	7,699	7,778	8,242
Rockbridge Co Pblc Schs	1	7,418	7,694	8,334	9,148
Rockingham Co Pblc Schs	2	7,006	7,339	7,826	8,435
Russell Co Pblc Schs	1	6,710	6,586	6,986	8,348

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Scott Co Pblc Schs	1	6,938	6,741	7,035	8,104
Shenandoah Co Pblc Schs	2	6,978	6,910	7,106	8,571
Smyth Co Pblc Schs	1	6,646	6,696	6,809	7,739
Southampton Co Pblc Schs	2	7,245	7,866	8,122	8,661
Spotsylvania Co Pblc Schs	3	6,942	7,056	7,296	8,029
Stafford Co Pblc Schs	3	6,539	6,937	7,028	7,562
Surry Co Pblc Schs	2	10,365	11,060	11,940	11,955
Sussex Co Pblc Schs	2	9,764	10,674	11,076	12,157
Tazewell Co Pblc Schs	1	6,387	6,778	7,060	7,715
Warren Co Pblc Schs	2	5,987	6,573	7,060	7,358
Washington Co Pblc Schs	1	7,036	6,871	7,072	7,837
Westmoreland Co Pblc Schs	2	6,863	6,895	7,320	8,506
Wise Co Pblc Schs	1	7,336	7,494	7,701	8,314
Wythe Co Pblc Schs	1	6,560	6,967	7,440	7,918
York Co Pblc Schs	3	6,733	6,846	7,453	7,977
Alexandria City Pblc Schs	3	12,391	13,208	14,479	15,961
Bristol City Pblc Schs	1	7,521	7,790	8,317	8,887
Buena Vista City Pblc Schs	1	7,151	9,100	8,191	8,304
Charlottesville Cty Pblc Schs	2	11,239	11,391	12,155	12,307
Colnl Heights City Pblc Schs	2	8,194	8,901	8,684	9,376

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Covington City Pblc Schs	1	9,034	9,478	10,150	10,978
Danville City Pblc Schs	2	7,330	7,774	8,247	8,462
Falls Church City Pblc Schs	2	12,922	13,107	13,949	15,368
Fredericksbrg City Pblc Schs	2	8,608	9,103	9,578	10,096
Galax City Pblc Schs	1	6,846	6,927	7,186	7,719
Hampton City Pblc Schs	3	7,007	7,324	7,847	8,540
Harrisonburg City Pblc Schs	2	8,626	8,741	9,229	9,837
Hopewell City Pblc Schs	2	7,655	8,079	8,102	8,892
Lynchburg City Pblc Schs	2	7,701	7,882	8,220	8,602
Martinsville City Pblc Schs	2	7,912	8,287	8,580	8,741
Newport News City Pblc Schs	3	7,101	7,587	7,953	8,557
Norfolk City Pblc Schs	3	7,781	7,952	8,415	9,076
Norton City Pblc Schs	1	7,426	7,389	8,518	8,040
Petersburg City Pblc Schs	2	7,095	7,804	8,142	8,908
Portsmouth City Pblc Schs	3	7,046	7,819	7,827	8,744
Radford City Pblc Schs	1	7,432	7,396	7,630	8,173
Richmond City Pblc Schs	3	9,711	9,955	10,710	12,201
Roanoke City Pblc Schs	3	7,848	8,241	8,553	9,690
Staunton City Pblc Schs	2	7,981	9,610	8,560	9,120
Suffolk City Pblc Schs	3	6,678	7,021	7,264	8,038

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Va Beach City Pblc Schs	3	7,372	7,414	7,951	8,633
Waynesboro City Pblc Schs	2	7,162	7,417	7,858	8,815
Wmsburg-James City Pblc Schs	2	8,126	8,711	12,118	15,810
Winchester City Pblc Schs	2	8,821	9,331	10,040	10,487
Franklin City Pblc Schs	2	8,921	8,394	9,158	10,119
Chesapeake City Pblc Schs	3	7,111	7,510	7,724	8,439
Salem City Pblc Schs	2	7,050	7,744	8,131	8,386
Poquoson City Pblc Schs	2	6,172	6,468	6,960	7,224
Manassas City Pblc Schs	2	7,991	8,744	9,121	10,273
Manassas Park City Pblc Schs	2	7,442	8,315	9,021	9,838
Colonial Beach Pblc Schs	2	6,764	7,863	7,732	9,743
West Point Pblc Schs	2	8,397	8,681	8,746	9,494

APPENDIX C

ATTENDANCE RATES FOR THE CLASS OF 2005-2008

Legend: 1-Appalachian, 2-Non-Appalachian of Similar Size, and 3-Non Appalachian Large School Divisions

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Accomack	2	0.93	0.94	0.94	0.95
Albermarle	3	0.96	0.95	0.95	0.96
Allegheny	1	0.94	0.94	0.96	0.95
Amelia	2	0.94	0.93	0.93	0.94
Amherst	2	0.94	0.92	0.94	0.94
Appomattox	2	0.94	0.93	0.93	0.93
Arlington	3	0.95	0.95	0.94	0.94
Augusta	3	0.93	0.93	0.93	0.93
Bath	1	0.94	0.94	0.95	0.94
Bedford	3	0.94	0.94	0.95	0.94
Bland	1	0.94	0.93	0.94	0.95
Botetourt	1	0.94	0.95	0.95	0.95
Brunswick	2	0.91	0.90	0.89	0.89
Buchanan	1	0.91	0.91	0.90	0.93
Buckingham	2	0.91	0.92	0.92	0.91
Campbell	2	0.93	0.93	0.94	0.94
Caroline	2	0.94	0.91	0.91	0.92

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Carroll	1	0.95	0.96	0.94	0.95
Charles City	2	0.94	0.99	0.95	0.95
Charlotte	2	0.95	0.95	0.94	0.95
Chesterfield	3	0.95	0.94	0.94	0.94
Clarke	2	0.94	0.94	0.95	0.94
Craig	1	0.96	0.97	0.97	0.98
Culpepper	2	0.94	0.93	0.93	0.93
Cumberland	2	0.92	0.94	0.92	0.94
Dickenson	1	0.94	0.94	0.94	0.94
Dinwiddie	2	0.95	0.94	0.92	0.93
Essex	2	0.93	0.94	0.94	0.93
Fairfax	3	0.95	0.95	0.95	0.95
Fauquier	2	0.95	0.95	0.95	0.95
Floyd	1	0.95	0.95	0.94	0.95
Fluvanna	2	0.93	0.95	0.94	0.95
Franklin	2	0.95	0.95	0.95	0.94
Fredrick	3	0.93	0.93	0.93	0.93
Giles	1	0.94	0.95	0.95	0.94
Gloucester	2	0.94	0.93	0.94	0.94
Goochland	2	0.95	0.94	0.94	0.97
Grayson	1	0.96	0.96	0.95	0.96

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Greene	2	0.93	0.94	0.96	0.93
Greensville	2	0.93	0.91	0.90	0.92
Halifax	2	0.95	0.95	0.94	0.95
Hanover	3	0.96	0.96	0.96	0.97
Henrico	3	0.94	0.94	0.94	0.94
Henry	1	0.92	0.93	0.93	0.91
Highland	1	0.95	0.94	0.95	0.93
Isle of Wright	2	0.94	0.94	0.96	0.97
King George	2	0.91	0.93	0.93	0.93
King & Queen	2	0.95	0.93	0.91	0.91
King William	2	0.94	0.94	0.95	0.94
Lancaster	2	0.94	0.42	0.94	0.94
Lee	1	0.92	0.93	0.92	0.93
Loudoun	3	0.95	0.95	0.95	0.95
Louisa	2	0.94	0.94	0.95	0.95
Lunenburg	2	0.92	0.91	0.92	0.93
Madison	2	0.94	0.96	0.94	0.94
Mathews	2	0.96	0.96	0.96	0.96
Mecklenburg	2	0.95	0.94	0.93	0.93
Middlesex	2	0.94	0.94	0.95	0.94

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Montgomery	1	0.95	0.95	0.95	0.95
Nelson	2	0.96	0.99	0.96	0.94
New Kent	2	0.95	0.94	0.95	0.95
Northampton	2	0.93	0.91	0.92	0.93
Northumberland	2	0.92	0.93	0.93	0.93
Nottoway	2	0.92	0.91	0.91	0.92
Orange	2	0.96	0.95	0.94	0.94
Page	2	0.92	0.92	0.93	0.93
Patrick	1	0.94	0.94	0.94	0.94
Pittsylvania	2	0.92	0.92	0.92	0.93
Powhatan	2	0.93	0.94	0.93	0.94
Prince Edward	2	0.94	0.94	0.93	0.94
Prince George	2	0.94	0.94	0.94	0.94
Prince William	3	0.93	0.93	0.93	0.93
Pulaski	1	0.95	0.96	0.94	0.94
Rappahannock	2	0.94	0.94	0.94	0.93
Richmond	2	0.95	0.95	0.94	0.94
Roanoke	3	0.95	0.95	0.96	0.94
Rockbridge	1	0.92	0.94	0.94	0.93
Rockingham	2	0.95	0.94	0.94	0.95

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Russell	1	0.95	0.95	0.96	0.95
Scott	1	0.95	0.95	0.94	0.94
Shenandoah	2	0.95	0.95	0.95	0.95
Smyth	1	0.95	0.95	0.94	0.95
Southampton	2	0.95	0.95	0.94	0.94
Spotsylvania	3	0.92	0.92	0.92	0.92
Stafford	3	0.94	0.94	0.94	0.94
Surry	2	0.93	0.93	0.93	0.94
Sussex	2	0.92	0.92	0.92	0.91
Tazewell	1	0.90	0.90	0.93	0.92
Warren	2	0.91	0.90	0.89	0.89
Washington	1	0.94	0.95	0.95	0.95
Westmoreland	2	0.93	0.94	0.93	0.94
Wise	1	0.94	0.94	0.94	0.94
Wythe	1	0.92	0.93	0.93	0.94
York	3	0.96	0.97	0.96	0.96
Alexandria City	3	0.95	0.91	0.93	0.91
Briston City	1	0.93	0.92	0.92	0.93
Buena Vista City	1	0.93	0.94	0.95	0.94
Charlottesville City	2	0.94	0.94	0.95	0.94

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Colonial Heights City	2	0.94	0.94	0.93	0.93
Covington City	1	0.93	0.93	0.95	0.95
Danville City	2	0.92	0.92	0.93	0.92
Falls Church City	2	0.96	0.95	0.96	0.96
Fredericksburg City	2	0.93	0.93	0.91	0.92
Galax City	1	0.95	0.95	0.95	0.95
Hampton City	3	0.94	0.94	0.94	0.94
Harrisonburg City	2	0.93	0.93	0.93	0.93
Hopewell City	2	0.93	0.94	0.94	0.94
Lynchburg City	2	0.93	0.93	0.94	0.94
Martinsville City	2	0.93	0.92	0.92	0.92
Newport News City	3	0.91	0.92	0.92	0.93
Norfolk City	3	0.91	0.91	0.92	0.93
Norton City	1	0.93	0.95	0.93	0.90
Petersburg City	2	0.87	0.88	0.87	0.87
Portsmouth City	3	0.93	0.95	0.91	0.92
Radford City	1	0.93	0.94	0.94	0.94
Richmond City	3	0.87	0.88	0.88	0.89
Roanoke City	3	0.92	0.93	0.93	0.90
Staunton City	2	0.94	0.94	0.93	0.95

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Virginia Beach City	3	0.94	0.94	0.94	0.95
Waynesboro City	2	0.93	0.92	0.94	0.94
Williamsburg-James City	2	0.94	0.94	0.94	0.94
Winchester City	2	0.93	0.92	0.92	0.92
Franklin City	2	0.92	0.94	0.90	0.96
Chesapeake City	3	0.94	0.94	0.94	0.94
Salem City	2	0.96	0.95	0.96	0.95
Poquoson City	2	0.95	0.94	0.95	0.94
Manassas City	2	0.96	0.96	0.95	0.95
Manassas Park City	2	0.95	0.95	0.94	0.94
Colonial Beach	2	0.99	0.92	0.91	0.92
Westpoint City	2	0.97	0.96	0.96	0.96

APPENDIX D

SOCIOECONOMIC STATUS- PERCENTAGE OF STUDENTS RECEIVING FREE OR REDUCED LUNCHES

Legend: 1- Appalachian, 2-Non-Appalachian of Similar Size, and 3-Non Appalachian Large School Divisions

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Accomack	2	0.61	0.60	0.61	0.61
Albermarle	3	0.20	0.18	0.18	0.20
Allegheny	1	0.30	0.33	0.34	0.37
Amelia	2	0.33	0.34	0.35	0.40
Amherst	2	0.31	0.33	0.36	0.39
Appomattox	2	0.32	0.36	0.37	0.38
Arlington	3	0.41	0.41	0.39	0.42
Augusta	3	0.23	0.24	0.25	0.29
Bath	1	0.28	0.30	0.31	0.33
Bedford	3	0.26	0.27	0.27	0.30
Bland	1	0.32	0.36	0.37	0.35
Botetourt	1	0.13	0.13	0.13	0.14
Brunswick	2	0.62	0.64	0.70	0.71
Buchanan	1	0.70	0.69	0.70	0.74
Buckingham	2	0.52	0.52	0.55	0.56
Campbell	2	0.30	0.31	0.32	0.33
Caroline	2	0.39	0.39	0.39	0.41

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Carroll	1	0.46	0.47	0.49	0.50
Charles City	2	0.47	0.48	0.44	0.40
Charlotte	2	0.48	0.50	0.51	0.52
Chesterfield	3	0.18	0.21	0.21	0.22
Clarke	2	0.14	0.14	0.14	0.14
Craig	1	0.22	0.25	0.25	0.28
Culpepper	2	0.32	0.32	0.33	0.32
Cumberland	2	0.58	0.59	0.57	0.58
Dickenson	1	0.57	0.57	0.57	0.58
Dinwiddie	2	0.32	0.34	0.37	0.38
Essex	2	0.44	0.46	0.54	0.50
Fairfax	3	0.21	0.19	0.20	0.21
Fauquier	2	0.15	0.15	0.15	0.15
Floyd	1	0.33	0.34	0.32	0.34
Fluvanna	2	0.18	0.17	0.18	0.19
Franklin	2	0.36	0.37	0.39	0.40
Fredrick	3	0.16	0.16	0.18	0.19
Giles	1	0.29	0.31	0.32	0.34
Gloucester	2	0.25	0.27	0.27	0.27
Goochland	2	0.19	0.20	0.21	0.22
Grayson	1	0.47	0.52	0.52	0.54

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Greene	2	0.22	0.25	0.27	0.26
Greensville	2	0.55	0.56	0.57	0.62
Halifax	2	0.52	0.55	0.54	0.59
Hanover	3	0.11	0.12	0.12	0.12
Henrico	3	0.25	0.26	0.28	0.29
Henry	1	0.37	0.40	0.44	0.46
Highland	1	0.31	0.39	0.47	0.46
Isle of Wright	2	0.32	0.32	0.31	0.34
King George	2	0.22	0.22	0.21	0.22
King & Queen	2	0.60	0.60	0.60	0.69
King William	2	0.25	0.25	0.28	0.30
Lancaster	2	0.50	0.50	0.52	0.51
Lee	1	0.62	0.60	0.63	0.65
Loudoun	3	0.10	0.11	0.12	0.13
Louisa	2	0.32	0.34	0.34	0.41
Lunenburg	2	0.57	0.61	0.62	0.62
Madison	2	0.21	0.21	0.21	0.22
Mathews	2	0.24	0.25	0.25	0.23
Mecklenburg	2	0.51	0.55	0.57	0.59
Middlesex	2	0.29	0.32	0.33	0.35

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Montgomery	1	0.28	0.31	0.33	0.34
Nelson	2	0.35	0.36	0.39	0.40
New Kent	2	0.13	0.14	0.16	0.14
Northampton	2	0.67	0.65	0.69	0.66
Northumberland	2	0.45	0.47	0.48	0.50
Nottoway	2	0.51	0.52	0.50	0.54
Orange	2	0.28	0.26	0.29	0.29
Page	2	0.34	0.35	0.38	0.39
Patrick	1	0.40	0.41	0.45	0.45
Pittsylvania	2	0.35	0.36	0.38	0.40
Powhatan	2	0.12	0.12	0.12	0.13
Prince Edward	2	0.61	0.61	0.62	0.75
Prince George	2	0.30	0.29	0.31	0.31
Prince William	3	0.21	0.21	0.24	0.26
Pulaski	1	0.34	0.37	0.37	0.40
Rappahannock	2	0.15	0.16	0.17	0.14
Richmond	2	0.33	0.34	0.36	0.39
Roanoke	3	0.12	0.13	0.16	0.16
Rockbridge	1	0.29	0.29	0.30	0.32
Rockingham	2	0.25	0.26	0.28	0.30

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Russell	1	0.47	0.47	0.49	0.50
Scott	1	0.46	0.47	0.51	0.52
Shenandoah	2	0.23	0.24	0.25	0.27
Smyth	1	0.42	0.43	0.45	0.46
Southampton	2	0.42	0.41	0.41	0.40
Spotsylvania	3	0.16	0.17	0.18	0.20
Stafford	3	0.13	0.14	0.13	0.14
Surry	2	0.51	0.55	0.50	0.52
Sussex	2	0.67	0.66	0.69	0.74
Tazewell	1	0.46	0.47	0.49	0.49
Warren	2	0.20	0.23	0.23	0.24
Washington	1	0.37	0.38	0.38	0.40
Westmoreland	2	0.54	0.52	0.50	0.52
Wise	1	0.45	0.48	0.50	0.50
Wythe	1	0.37	0.38	0.40	0.40
York	3	0.15	0.14	0.14	0.15
Alexandria City	3	0.49	0.51	0.51	0.52
Briston City	1	0.42	0.46	0.46	0.52
Buena Vista City	1	0.32	0.34	0.31	0.30
Charlottesville City	2	0.49	0.46	0.48	0.52

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Colonial Heights City	2	0.20	0.21	0.22	0.24
Covington City	1	0.36	0.36	0.36	0.40
Danville City	2	0.60	0.59	0.61	0.62
Falls Church City	2	0.07	0.09	0.08	0.08
Fredericksburg City	2	0.47	0.47	0.48	0.52
Galax City	1	0.44	0.44	0.47	0.49
Hampton City	3	0.38	0.40	0.40	0.45
Harrisonburg City	2	0.43	0.44	0.46	0.51
Hopewell City	2	0.56	0.59	0.60	0.63
Lynchburg City	2	0.44	0.46	0.49	0.52
Martinsville City	2	0.48	0.51	0.53	0.54
Newport News City	3	0.50	0.51	0.51	0.51
Norfolk City	3	0.58	0.60	0.56	0.60
Norton City	1	0.47	0.46	0.46	0.48
Petersburg City	2	0.70	0.70	0.72	0.69
Portsmouth City	3	0.55	0.53	0.52	0.56
Radford City	1	0.22	0.23	0.23	0.28
Richmond City	3	0.64	0.65	0.72	0.69
Roanoke City	3	0.56	0.58	0.60	0.62
Staunton City	2	0.38	0.39	0.39	0.40

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Suffolk City	3	0.41	0.41	0.40	0.39
Virginia Beach City	3	0.26	0.30	0.31	0.29
Waynesboro City	2	0.39	0.41	0.42	0.48
Williamsburg-James City	2	0.24	0.25	0.24	0.25
Winchester City	2	0.36	0.37	0.39	0.42
Franklin City	2	0.36	0.65	0.63	0.80
Chesapeake City	3	0.24	0.25	0.25	0.25
Salem City	2	0.17	0.18	0.20	0.22
Poquoson City	2	0.04	0.05	0.06	0.07
Manassas City	2	0.18	0.22	0.23	0.23
Manassas Park City	2	0.28	0.31	0.31	0.33
Colonial Beach	2	0.41	0.40	0.44	0.47
Westpoint City	2	0.12	0.12	0.15	0.15

APPENDIX E

PERCENTAGE OF HIGHLY QUALIFIED TEACHERS

Legend: 1-Appalachian, 2-Non-Appalachian of Similar Size, and 3-Non Appalachian Large School Divisions

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Accomack County	2	0.68	0.68	0.77	0.84
Albemarle County	3	0.81	0.81	0.92	0.95
Alleghany County	1	0.83	0.83	0.96	0.98
Amelia County	2	0.63	0.63	0.92	0.97
Amherst County	2	0.90	0.90	0.96	0.96
Appomattox County	2	0.87	0.87	0.97	0.95
Arlington County	3	0.75	0.75	0.93	0.96
Augusta County	3	0.88	0.88	0.97	0.99
Bath County	1	0.84	0.84	0.91	0.89
Bedford County	3	0.83	0.83	0.97	0.98
Bland County	1	0.73	0.73	0.94	0.98
Botetourt County	1	0.87	0.87	0.97	0.98
Brunswick County	2	0.56	0.56	0.85	0.85
Buchanan County	1	0.71	0.71	0.95	0.96
Buckingham County	2	0.74	0.74	0.89	0.89
Campbell County	2	0.78	0.78	0.94	0.95

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Caroline County	2	0.74	0.74	0.94	0.90
Carroll County	1	0.82	0.82	0.96	0.99
Charles City County	2	0.75	0.75	0.87	0.88
Charlotte County	2	0.78	0.78	0.90	0.91
Chesterfield County	3	0.90	0.90	0.97	0.99
Clarke County	2	0.78	0.78	0.87	0.93
Craig County	1	0.75	0.75	0.86	0.86
Culpeper County	2	0.58	0.58	0.73	0.82
Cumberland County	2	0.57	0.57	0.80	0.90
Dickenson County	1	0.78	0.78	0.90	0.92
Dinwiddie County	2	0.79	0.79	0.94	0.94
Essex County	2	0.85	0.85	0.96	0.95
Fairfax County	3	0.86	0.86	0.96	0.97
Fauquier County	2	0.83	0.83	0.96	0.99
Floyd County	1	0.76	0.76	0.94	0.96
Fluvanna County	2	0.67	0.67	0.91	0.83
Franklin County	2	0.87	0.87	0.94	0.92
Frederick County	3	0.87	0.87	0.97	0.97
Giles County	1	0.86	0.86	0.99	0.97
Gloucester County	2	0.77	0.77	0.89	0.94

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Goochland County	2	0.83	0.83	0.95	0.93
Grayson County	1	0.84	0.84	0.93	0.89
Greene County	2	0.70	0.70	0.89	0.93
Greensville County	2	0.65	0.65	0.80	0.81
Halifax County	2	0.83	0.83	0.93	0.95
Hanover County	3	0.92	0.92	0.99	0.99
Henrico County	3	0.77	0.77	0.96	0.98
Henry County	1	0.75	0.75	0.89	0.84
Highland County	1	0.74	0.74	0.89	0.96
Isle of Wight County	2	0.86	0.86	0.91	0.96
King George County	2	0.67	0.67	0.90	0.92
King and Queen County	2	0.46	0.46	0.87	0.92
King William County	2	0.81	0.81	0.91	0.90
Lancaster County	2	0.55	0.55	0.79	0.87
Lee County	1	0.83	0.83	0.95	0.96
Loudoun County	3	0.88	0.88	0.98	0.98
Louisa County	2	0.82	0.82	0.87	0.91
Lunenburg County	2	0.77	0.77	0.94	0.89
Madison County	2	0.62	0.62	0.87	0.87
Mathews County	2	0.80	0.80	0.95	0.97
Mecklenburg County	2	0.81	0.81	0.89	0.88

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Middlesex County	2	0.80	0.80	0.96	0.97
Montgomery County	1	0.90	0.90	0.97	0.98
Nelson County	2	0.87	0.87	1.00	0.97
New Kent County	2	0.72	0.72	0.84	0.93
Northampton County	2	0.77	0.77	0.91	0.92
Northumberland County	2	0.84	0.84	0.85	0.84
Nottoway County	2	0.68	0.68	0.87	0.97
Orange County	2	0.65	0.65	0.77	0.80
Page County	2	0.80	0.80	0.89	0.97
Patrick County	1	0.76	0.76	0.94	0.97
Pittsylvania County	2	0.84	0.84	0.93	0.92
Powhatan County	2	0.88	0.88	0.98	0.99
Prince Edward County	2	0.73	0.73	0.91	0.98
Prince George County	2	0.92	0.92	0.98	0.97
Prince William County	3	0.74	0.74	0.94	0.94
Pulaski County	1	0.88	0.88	0.92	0.96
Rappahannock County	2	0.83	0.83	0.96	0.88
Richmond County	2	0.90	0.90	1.00	1.00
Roanoke County	3	0.95	0.95	0.99	1.00
Rockbridge County	1	0.88	0.88	0.96	0.95
Rockingham County	2	0.93	0.93	0.99	1.00

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Russell County	1	0.83	0.83	0.93	0.91
Scott County	1	0.80	0.80	0.90	0.91
Shenandoah County	2	0.83	0.83	0.91	0.95
Smyth County	1	0.90	0.90	0.94	0.97
Southampton County	2	0.85	0.85	0.89	0.96
Spotsylvania County	3	0.83	0.83	0.96	0.98
Stafford County	3	0.89	0.89	0.97	0.97
Surry County	2	0.66	0.66	0.86	0.89
Sussex County	2	0.45	0.45	0.66	0.70
Tazewell County	1	0.92	0.92	0.99	0.99
Warren County	2	0.75	0.75	0.89	0.91
Washington County	1	0.93	0.93	0.97	0.99
Westmoreland County	2	0.59	0.59	0.89	0.86
Wise County	1	0.94	0.94	0.98	0.99
Wythe County	1	0.91	0.91	0.95	0.94
York County	3	0.91	0.91	0.99	0.99
Alexandria City	3	0.80	0.80	0.90	0.94
Bristol City	1	0.91	0.91	0.94	0.94
Buena Vista City	1	0.85	0.85	0.93	0.89
Charlottesville City	2	0.83	0.83	0.92	0.96
Colonial Heights City	2	0.92	0.92	0.98	0.97

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Covington City	1	1.00	1.00	0.99	0.97
Danville City	2	0.77	0.77	0.90	0.88
Falls Church City	2	0.88	0.88	0.94	0.96
Fredericksburg City	2	0.77	0.77	0.96	0.99
Galax City	1	0.73	0.73	0.98	1.00
Hampton City	3	0.70	0.70	0.89	0.91
Harrisonburg City	2	0.90	0.90	0.97	0.98
Hopewell City	2	0.73	0.73	0.95	0.95
Lynchburg City	2	0.85	0.85	0.96	0.94
Martinsville City	2	0.70	0.70	0.85	0.83
Newport News City	3	0.80	0.80	0.94	0.95
Norfolk City	3	0.71	0.71	0.89	0.94
Norton City	1	0.84	0.84	0.82	0.99
Petersburg City	2	0.65	0.65	0.92	0.79
Portsmouth City	3	0.84	0.84	0.94	0.94
Radford City	1	0.94	0.94	1.00	1.00
Richmond City	3	0.81	0.81	0.98	0.99
Roanoke City	3	0.72	0.72	0.80	0.92
Staunton City	2	0.91	0.91	0.96	0.97
Suffolk City	3	0.80	0.80	0.90	0.94
Virginia Beach City	3	0.92	0.92	0.97	0.94

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Waynesboro City	2	0.88	0.88	0.96	0.98
Williamsburg-James City County	2	0.87	0.87	0.92	0.96
Winchester City	2	0.90	0.90	0.98	0.99
Franklin City	2	0.55	0.55	0.92	0.96
Chesapeake City	3	0.92	0.92	0.98	0.98
Salem City	2	0.96	0.96	1.00	0.99
Poquoson City	2	0.89	0.89	0.98	0.98
Manassas City	2	0.76	0.76	0.93	0.98
Manassas Park City	2	0.79	0.79	0.90	0.91
Colonial Beach	2	0.66	0.66	0.78	0.61
West Point	2	0.90	0.90	0.96	0.96

APPENDIX F

ON-TIME EDUCATIONAL ATTAINMENT RATES THAT ACCOUNT FOR THE NINTH GRADE BUBBLE

Legend: 1-Appalachian, 2-Non-Appalachian of Similar Size, and 3-Non Appalachian Large School Divisions

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Accomack	2	0.76	0.66	0.80	0.80
Albemarle	3	0.86	0.82	0.81	0.87
Alleghany Hglnds	1	0.82	0.86	0.81	0.84
Amelia	2	0.82	0.84	0.79	0.77
Amherst	2	0.88	0.97	0.83	1.67
Appomattox	2	0.77	0.78	0.78	0.90
Arlington	3	0.81	0.80	0.82	0.83
Augusta	3	0.84	0.83	0.84	0.86
Bath	1	0.93	0.85	0.85	1.09
Bedford	3	0.82	0.85	0.87	0.90
Bland	1	0.88	0.88	0.92	0.85
Botetourt	1	0.83	0.81	0.90	0.90
Brunswick	2	0.75	0.62	0.77	0.72
Buchanan	1	0.71	0.90	0.92	0.86
Buckingham	2	0.79	0.81	0.74	0.96
Campbell	2	0.87	0.82	0.88	0.93

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Caroline	2	0.68	0.78	0.67	0.61
Carroll	1	0.79	0.81	0.79	0.75
Charles City County	2	0.78	0.82	0.82	0.88
Charlotte	2	0.85	0.94	0.95	0.84
Chesterfield	3	0.81	0.84	0.83	0.85
Clarke	2	0.90	0.94	0.97	0.87
Craig	1	0.86	0.90	0.72	0.78
Culpeper	2	0.81	0.80	0.76	0.74
Cumberland	2	0.66	0.63	0.74	0.75
Dickenson	1	0.88	0.90	0.88	0.94
Dinwiddie	2	0.76	0.81	0.72	0.73
Essex	2	0.83	0.89	0.74	0.85
Fairfax	3	0.87	0.88	0.89	0.90
Fauquier	2	0.87	0.87	0.90	0.87
Floyd	1	0.80	0.82	0.79	0.84
Fluvanna	2	0.75	0.78	0.81	0.78
Franklin	2	0.84	0.84	0.85	0.80
Frederick	3	0.82	0.75	0.78	0.83
Giles	1	0.91	0.82	0.86	0.88
Gloucester	2	0.77	0.76	0.85	0.85

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Goochland	2	0.95	0.99	0.97	0.85
Grayson	1	0.85	0.83	0.94	0.92
Greene	2	0.75	0.74	0.86	0.79
Greensville	2	0.82	0.94	0.70	0.80
Halifax	2	0.78	0.82	0.84	0.87
Hanover	3	0.89	0.84	0.87	0.91
Henrico	3	0.77	0.76	0.77	0.84
Henry	1	0.90	0.90	0.88	0.89
Highland	1	0.96	0.94	0.92	1.03
Isle Of Wight	2	0.79	0.79	0.74	0.82
King George	2	0.76	0.77	0.71	0.75
King And Queen	2	0.81	0.66	0.67	0.77
King William	2	0.75	0.81	0.85	0.82
Lancaster	2	0.83	0.84	0.91	0.86
Lee	1	0.59	0.64	0.65	0.65
Loudoun	3	0.73	0.74	0.74	0.76
Louisa	2	0.77	0.79	0.78	0.83
Lunenburg	2	0.77	0.72	0.72	0.64
Madison	2	0.86	0.89	0.89	0.90
Mathews	2	0.96	0.93	0.99	1.00
Mecklenburg	2	0.77	0.77	0.80	0.75

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Middlesex	2	0.83	0.72	0.92	0.94
Montgomery	1	0.83	0.82	0.84	0.84
Nelson	2	0.96	0.92	0.94	0.87
New Kent	2	0.76	0.82	0.84	0.81
Northampton	2	0.77	0.87	0.94	0.93
Northumberland	2	0.64	0.77	0.72	0.89
Nottoway	2	0.72	0.72	0.82	0.77
Orange	2	0.89	0.85	0.80	0.78
Page	2	0.73	0.81	0.90	0.90
Patrick	1	0.83	0.89	0.86	0.84
Pittsylvania	2	0.84	0.72	0.81	0.82
Powhatan	2	0.79	0.81	0.80	0.87
Prince Edward	2	0.73	0.74	0.89	0.76
Prince George	2	0.95	0.91	0.85	0.79
Prince William	3	0.66	0.70	0.68	0.73
Pulaski	1	0.85	0.82	0.84	0.85
Rappahannock	2	0.89	1.00	1.08	1.13
Richmond	2	0.85	0.82	0.81	0.95
Roanoke	3	0.87	0.87	0.91	0.89
Rockbridge	1	0.96	1.01	0.98	1.00
Rockingham	2	0.76	0.84	0.85	0.90

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Russell	1	0.80	0.84	0.79	0.85
Scott	1	0.98	0.90	0.88	0.79
Shenandoah	2	0.83	0.76	0.77	0.87
Smyth	1	0.88	0.87	0.88	0.92
Southampton	2	0.70	0.69	0.65	0.68
Spotsylvania	3	0.88	0.76	0.80	0.85
Stafford	3	0.78	0.81	0.83	0.84
Surry	2	0.80	0.83	0.82	0.86
Sussex	2	0.91	0.89	0.91	0.86
Tazewell	1	0.88	0.83	0.80	0.83
Warren	2	0.83	0.85	0.96	0.88
Washington	1	0.93	0.92	0.85	0.92
Westmoreland	2	0.74	0.75	0.78	0.84
Wise	1	0.83	0.89	0.89	0.89
Wythe	1	0.95	0.80	0.86	0.95
York	3	0.88	0.91	0.88	0.88
Alexandria City	3	0.74	0.73	0.83	0.84
Bristol City	1	0.80	0.73	0.71	0.78
Buena Vista City	1	0.97	0.84	0.93	1.02
Charlottesville City	2	0.81	0.73	0.80	0.86

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Colonial Heights City	2	0.70	0.75	0.83	0.68
Covington City	1	0.86	0.88	0.72	0.79
Danville City	2	0.71	0.77	0.79	0.85
Falls Church City	2	1.01	1.01	0.95	0.93
Fredericksburg City	2	0.53	0.74	0.81	0.66
Galax City	1	0.80	0.70	0.74	0.79
Hampton City	3	0.80	0.85	0.81	0.85
Harrisonburg City	2	0.79	0.77	0.81	0.77
Hopewell City	2	0.68	0.71	0.58	0.57
Lynchburg City	2	0.76	0.69	0.79	0.79
Martinsville City	2	0.83	0.91	0.95	0.82
Newport News City	3	0.76	0.75	0.76	0.77
Norfolk City	3	0.54	0.57	0.59	0.65
Norton City	1	0.89	0.86	0.70	0.88
Petersburg City	2	0.76	0.86	0.78	0.67
Portsmouth City	3	0.57	0.64	0.62	0.70
Radford City	1	1.02	0.83	0.92	0.94
Richmond City	3	0.68	0.69	0.68	0.69
Roanoke City	3	0.68	0.69	0.70	0.69
Staunton City	2	0.76	0.84	0.82	0.88
Suffolk City	3	0.73	0.67	0.67	0.70

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Virginia Beach City	3	0.78	0.79	0.83	0.85
Waynesboro City	2	0.89	0.78	0.84	0.78
Williamsburg-James City	2	0.81	0.80	0.75	0.84
Winchester City	2	0.79	0.72	0.78	0.72
Franklin City	2	0.78	0.86	0.69	0.83
Chesapeake City	3	0.83	0.84	0.86	0.90
Salem City	2	0.83	0.87	0.85	0.86
Poquoson City	2	0.92	0.99	0.95	0.99
Manassas City	2	0.80	0.79	0.76	0.80
Manassas Park City	2	0.68	0.55	0.69	0.73
Colonial Beach	2	0.61	0.79	0.75	1.02
West Point	2	1.01	0.91	0.97	0.84

APPENDIX G

ON-TIME EDUCATIONAL ATTAINMENT RATES WITHOUT ACCOUNTING FOR THE NINTH GRADE BUBBLE

Legend: 1- Appalachian, 2-Non-Appalachian of Similar Size, and 3-Non Appalachian Large School Divisions

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Accomack	2	0.68	0.59	0.73	0.73
Albemarle	3	0.80	0.77	0.75	0.79
Alleghany Hglnds	1	0.75	0.83	0.76	0.78
Amelia	2	0.75	0.81	0.76	0.71
Amherst	2	0.79	0.87	0.75	1.50
Appomattox	2	0.69	0.71	0.72	0.84
Arlington	3	0.73	0.75	0.78	0.80
Augusta	3	0.80	0.79	0.80	0.82
Bath	1	0.96	0.92	0.85	1.09
Bedford	3	0.80	0.84	0.86	0.87
Bland	1	0.92	0.85	0.86	0.84
Botetourt	1	0.78	0.76	0.87	0.86
Brunswick	2	0.81	0.70	0.87	0.76
Buchanan	1	0.69	0.85	0.84	0.79
Buckingham	2	0.70	0.71	0.68	0.92
Campbell	2	0.75	0.76	0.80	0.87

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Caroline	2	0.59	0.73	0.61	0.54
Carroll	1	1.08	1.00	0.92	0.82
Charles City County	2	0.70	0.79	0.81	0.85
Charlotte	2	0.79	0.88	0.85	0.77
Chesterfield	3	0.76	0.80	0.79	0.81
Clarke	2	0.89	0.91	0.94	0.86
Craig	1	0.80	0.81	0.63	0.76
Culpeper	2	0.81	0.80	0.74	0.71
Cumberland	2	0.60	0.59	0.70	0.70
Dickenson	1	0.83	0.86	0.86	0.93
Dinwiddie	2	0.66	0.67	0.61	0.62
Essex	2	0.73	0.76	0.64	0.74
Fairfax	3	0.83	0.83	0.85	0.86
Fauquier	2	0.82	0.80	0.84	0.84
Floyd	1	0.75	0.77	0.71	0.80
Fluvanna	2	0.76	0.75	0.80	0.72
Franklin	2	0.73	0.71	0.71	0.66
Frederick	3	0.72	0.65	0.69	0.76
Giles	1	0.92	0.79	0.85	0.88
Gloucester	2	0.68	0.68	0.77	0.75
Goochland	2	0.92	1.05	0.94	0.83

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Grayson	1	0.82	0.81	0.89	0.87
Greene	2	0.70	0.72	0.82	0.77
Greensville	2	0.82	0.96	0.68	0.80
Halifax	2	0.71	0.78	0.80	0.82
Hanover	3	0.85	0.81	0.83	0.88
Henrico	3	0.69	0.68	0.71	0.77
Henry	1	0.83	0.82	0.79	0.82
Highland	1	0.96	1.00	0.90	1.04
Isle Of Wight	2	0.69	0.71	0.68	0.75
King George	2	0.72	0.72	0.64	0.71
King And Queen	2	0.82	0.76	0.69	0.77
King William	2	0.72	0.73	0.84	0.80
Lancaster	2	0.70	0.75	0.87	0.78
Lee	1	0.51	0.57	0.61	0.60
Loudoun	3	0.70	0.71	0.72	0.74
Louisa	2	0.74	0.75	0.77	0.81
Lunenburg	2	0.73	0.60	0.66	0.56
Madison	2	0.74	0.80	0.81	0.83
Mathews	2	0.89	0.90	0.90	0.94
Mecklenburg	2	0.70	0.66	0.75	0.69

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Middlesex	2	0.78	0.70	0.84	0.91
Montgomery	1	0.76	0.77	0.78	0.78
Nelson	2	0.90	0.92	0.94	0.81
New Kent	2	0.69	0.78	0.77	0.77
Northampton	2	0.72	0.80	0.86	0.88
Northumberland	2	0.55	0.71	0.65	0.84
Nottoway	2	0.65	0.66	0.75	0.70
Orange	2	0.87	0.83	0.81	0.75
Page	2	0.69	0.79	0.87	0.87
Patrick	1	0.78	0.84	0.82	0.81
Pittsylvania	2	0.74	0.65	0.71	0.72
Powhatan	2	0.75	0.79	0.77	0.84
Prince Edward	2	0.65	0.64	0.76	0.69
Prince George	2	0.90	0.88	0.84	0.78
Prince William	3	0.57	0.61	0.60	0.64
Pulaski	1	0.80	0.76	0.77	0.79
Rappahannock	2	0.86	0.94	1.07	1.15
Richmond	2	0.77	0.78	0.74	0.84
Roanoke	3	0.86	0.85	0.88	0.89
Rockbridge	1	0.83	0.89	0.89	0.85

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Rockingham	2	0.72	0.81	0.81	0.87
Russell	1	0.81	0.81	0.80	0.84
Scott	1	1.01	0.88	0.86	0.79
Shenandoah	2	0.79	0.69	0.71	0.82
Smyth	1	0.82	0.83	0.83	0.88
Southampton	2	0.58	0.60	0.53	0.54
Spotsylvania	3	0.80	0.69	0.74	0.78
Stafford	3	0.73	0.75	0.77	0.79
Surry	2	0.71	0.78	0.79	0.84
Sussex	2	0.82	0.80	0.82	0.82
Tazewell	1	0.85	0.79	0.72	0.77
Warren	2	0.80	0.85	0.94	0.90
Washington	1	0.89	0.90	0.83	0.90
Westmoreland	2	0.72	0.71	0.78	0.86
Wise	1	0.77	0.84	0.86	0.87
Wythe	1	1.00	0.81	0.84	0.95
York	3	0.83	0.87	0.84	0.84
Alexandria City	3	0.76	0.74	0.85	0.82
Bristol City	1	0.68	0.62	0.54	0.67
Buena Vista City	1	0.86	0.79	0.89	0.93

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Charlottesville City	2	0.70	0.64	0.68	0.74
Colonial Heights City	2	0.69	0.70	0.82	0.64
Covington City	1	0.82	0.93	0.71	0.77
Danville City	2	0.56	0.61	0.65	0.71
Falls Church City	2	0.99	0.99	0.93	0.92
Fredericksburg City	2	0.48	0.67	0.71	0.60
Galax City	1	0.80	0.71	0.74	0.80
Hampton City	3	0.71	0.74	0.71	0.74
Harrisonburg City	2	0.72	0.66	0.71	0.67
Hopewell City	2	0.54	0.56	0.47	0.48
Lynchburg City	2	0.68	0.59	0.72	0.71
Martinsville City	2	0.75	0.86	0.88	0.74
Newport News City	3	0.71	0.69	0.71	0.73
Norfolk City	3	0.41	0.44	0.46	0.52
Norton City	1	0.89	0.89	0.76	0.99
Petersburg City	2	0.70	0.79	0.75	0.57
Portsmouth City	3	0.45	0.48	0.44	0.49
Radford City	1	0.96	0.75	0.89	0.94
Richmond City	3	0.60	0.60	0.58	0.60
Roanoke City	3	0.59	0.62	0.61	0.59

SCHOOL DIVISION	Code	Class of 2005	Class of 2006	Class of 2007	Class of 2008
Staunton City	2	0.65	0.74	0.72	0.88
Suffolk City	3	0.63	0.57	0.56	0.57
Virginia Beach City	3	0.73	0.72	0.75	0.78
Waynesboro City	2	0.78	0.72	0.75	0.73
Williamsburg-James City	2	0.76	0.75	0.71	0.79
Winchester City	2	0.69	0.65	0.67	0.65
Franklin City	2	0.84	0.91	0.68	0.78
Chesapeake City	3	0.78	0.79	0.81	0.83
Salem City	2	0.78	0.83	0.82	0.81
Poquoson City	2	0.90	0.96	0.91	0.96
Manassas City	2	0.76	0.73	0.67	0.66
Manassas Park City	2	0.61	0.44	0.57	0.62
Colonial Beach	2	0.53	0.75	0.67	0.88
West Point	2	0.96	0.89	0.92	0.80

APPENDIX H

STEPWISE MULTIPLE REGRESSION-SPSS OUTPUT

Descriptive Statistics

	Mean	Std. Deviation	N
OEA_WBA	.8190	.09107	523
PPE	$7,561.0172	$1,383.17725	523
Attendance	.9369	.01687	523
SES	.3762	.15986	523
TQ	.8633	.10737	523

Correlations

		OEA_WBA	PPE	Attendance	SES	TQ
Pearson Correlation	OEA_WBA	1.000	.054	.276	-.338	.193
	PPE	.054	1.000	-.021	.163	.117
	Attendance	.276	-.021	1.000	-.472	.169
	SES	-.338	.163	-.472	1.000	-.249
	TQ	.193	.117	.169	-.249	1.000
Sig. (1-tailed)	OEA_WBA	.	.109	.000	.000	.000
	PPE	.109	.	.312	.000	.004
	Attendance	.000	.312	.	.000	.000
	SES	.000	.000	.000	.	.000
	TQ	.000	.004	.000	.000	.
N	OEA_WBA	523	523	523	523	523
	PPE	523	523	523	523	523
	Attendance	523	523	523	523	523
	SES	523	523	523	523	523
	TQ	523	523	523	523	523

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.338[a]	.114	.112	.08581	.114	67.033	1	521	.000	
2	.363[b]	.132	.128	.08503	.018	10.557	1	520	.001	2.065

a. Predictors: (Constant), SES

b. Predictors: (Constant), SES, Attendance

c. Dependent Variable: OEA_WBA

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.494	1	.494	67.033	.000[a]
	Residual	3.836	521	.007		
	Total	4.329	522			
2	Regression	.570	2	.285	39.410	.000[b]
	Residual	3.760	520	.007		
	Total	4.329	522			

a. Predictors: (Constant), SES

b. Predictors: (Constant), SES, Attendance

c. Dependent Variable: OEA_WBA

Coefficients[a]

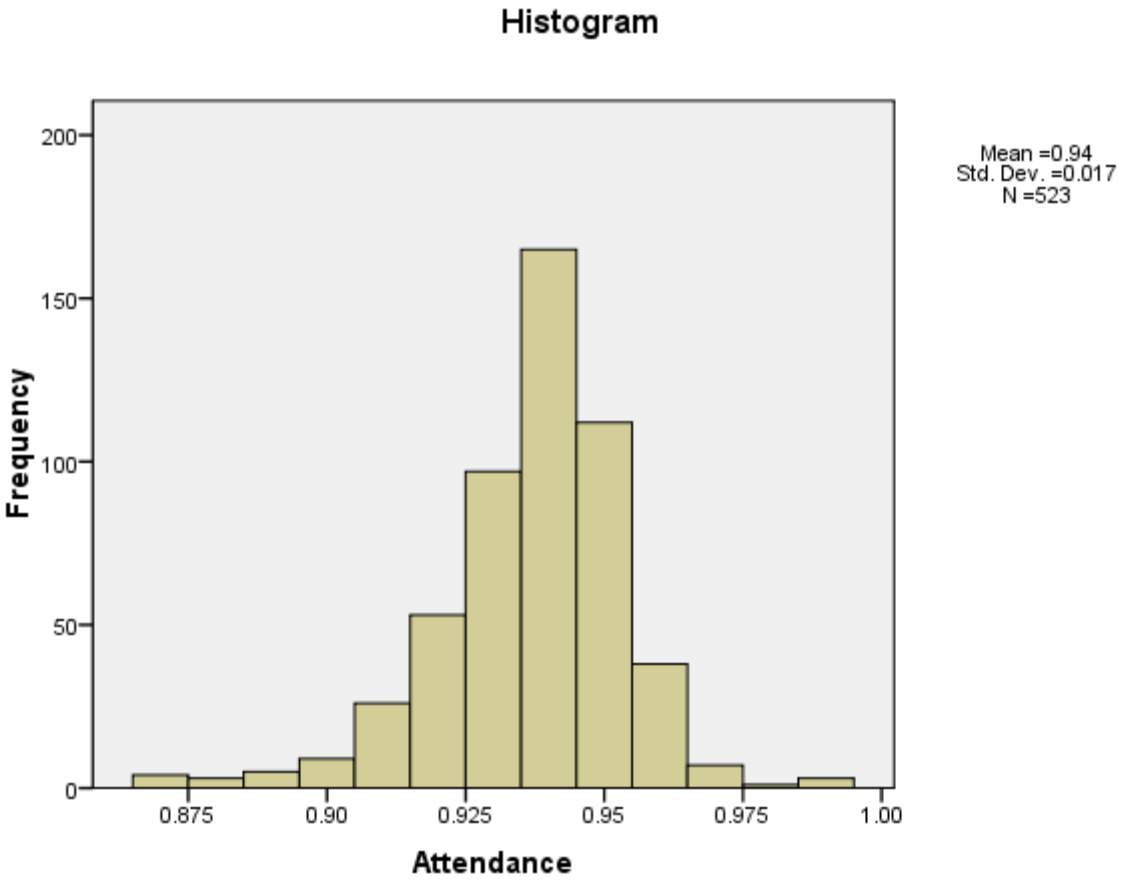
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.891	.010		92.840	.000		
	SES	-.192	.023	-.338	-8.187	.000	1.000	1.000
2	(Constant)	.114	.239		.477	.633		
	SES	-.152	.026	-.267	-5.751	.000	.777	1.286
	Attendance	.813	.250	.151	3.249	.001	.777	1.286

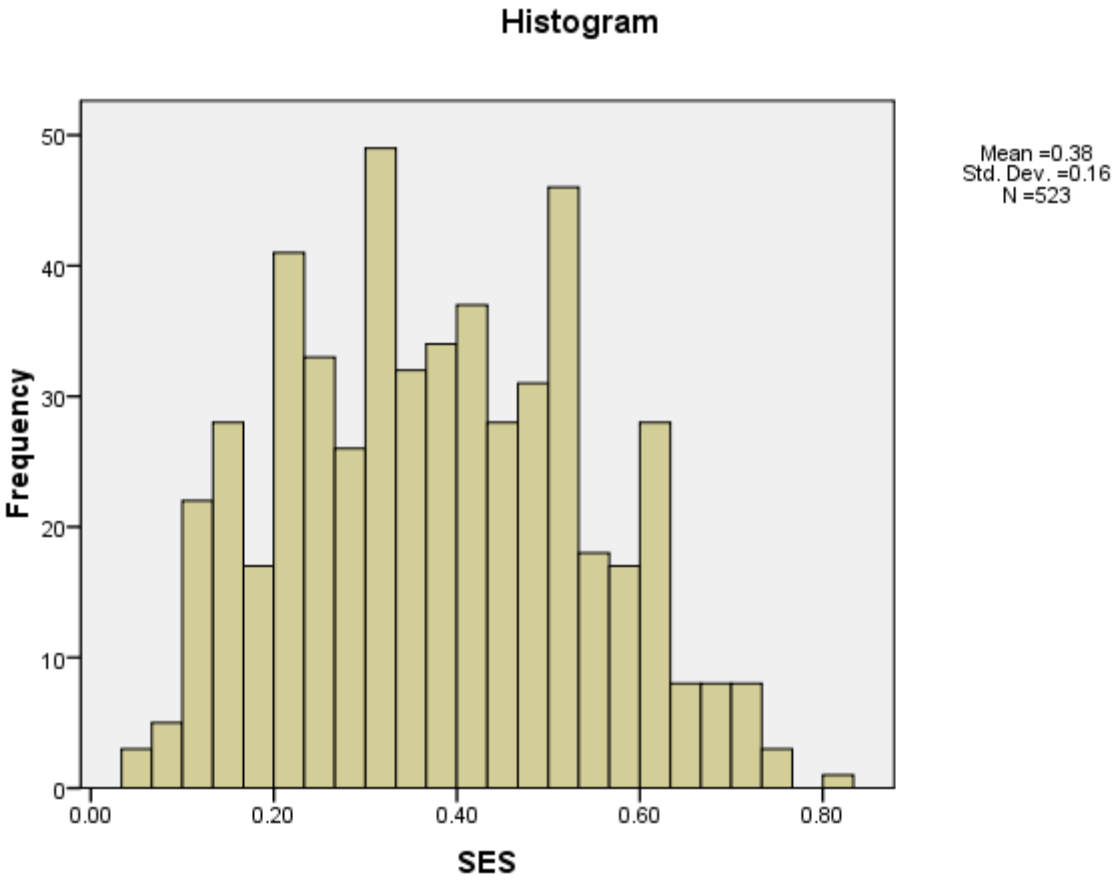
a. Dependent Variable: Grad_Rt_WB

Casewise Diagnostics[a]

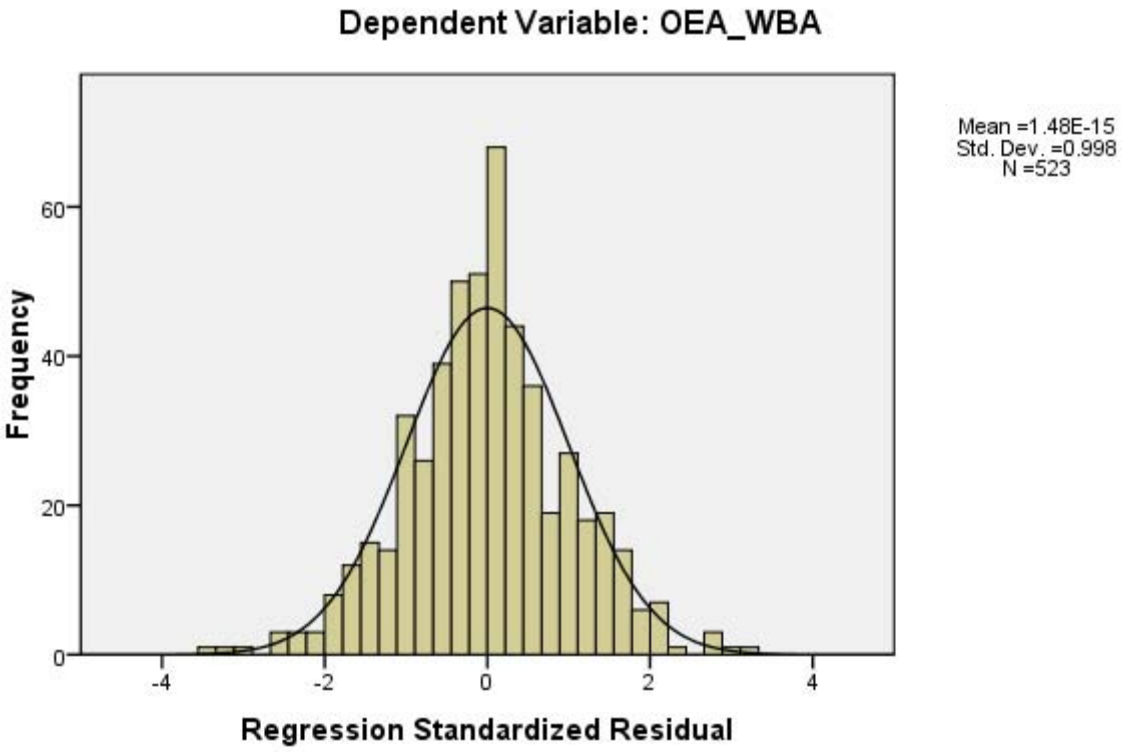
Case Number	Std. Residual	OEA_WBA	Predicted Value	Residual
103	-3.165	.53	.7991	-.26911
260	-3.407	.55	.8397	-.28967
401	3.075	1.09	.8285	.26149
466	3.302	1.13	.8492	.28077

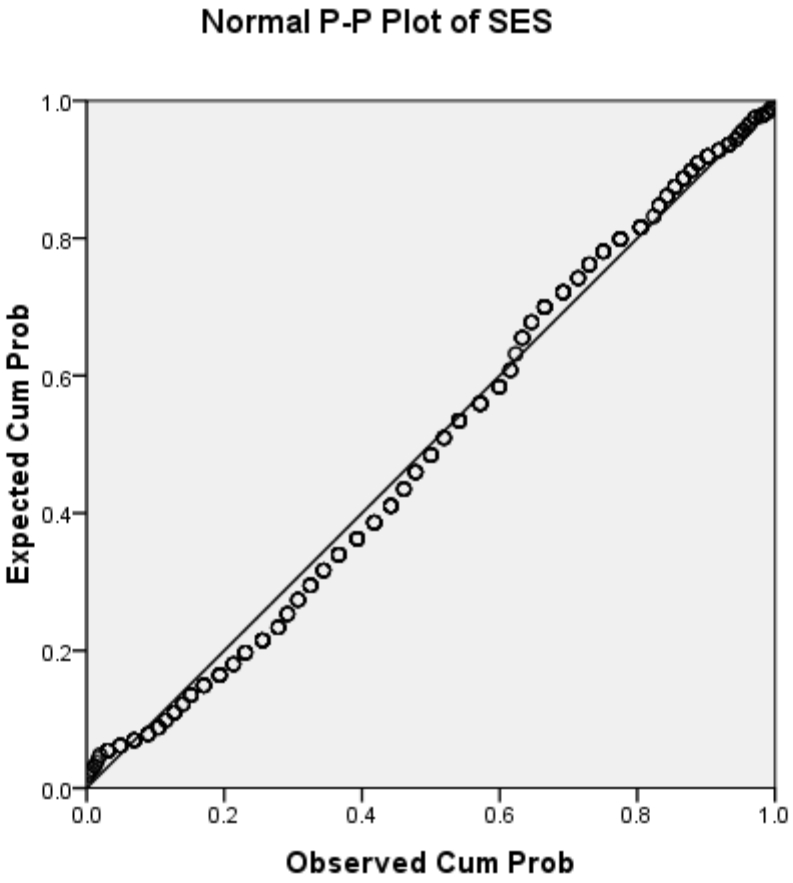
a. Dependent Variable: OEA_WBA

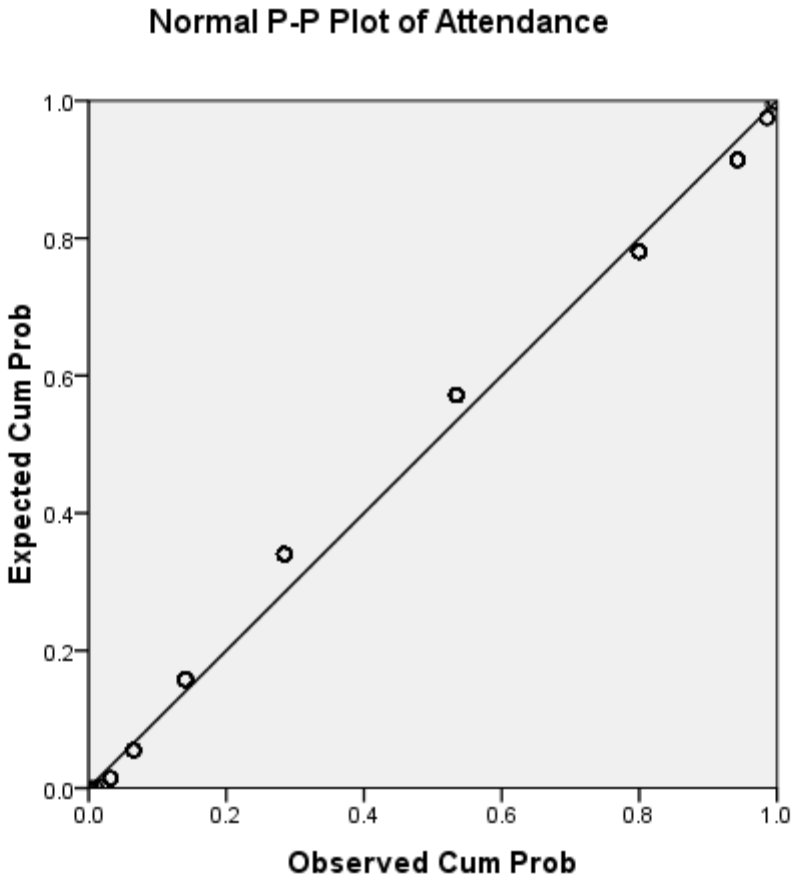

Histogram
Mean =0.94
Std. Dev. =0.017
N =523
Frequency
200
150
100
50
0
0.875
0.90
0.925
0.95
0.975
1.00
Attendance


Histogram
Mean =0.38
Std. Dev. =0.16
N =523
Frequency
SES
0
10
20
30
40
50
0.00
0.20
0.40
0.60
0.80

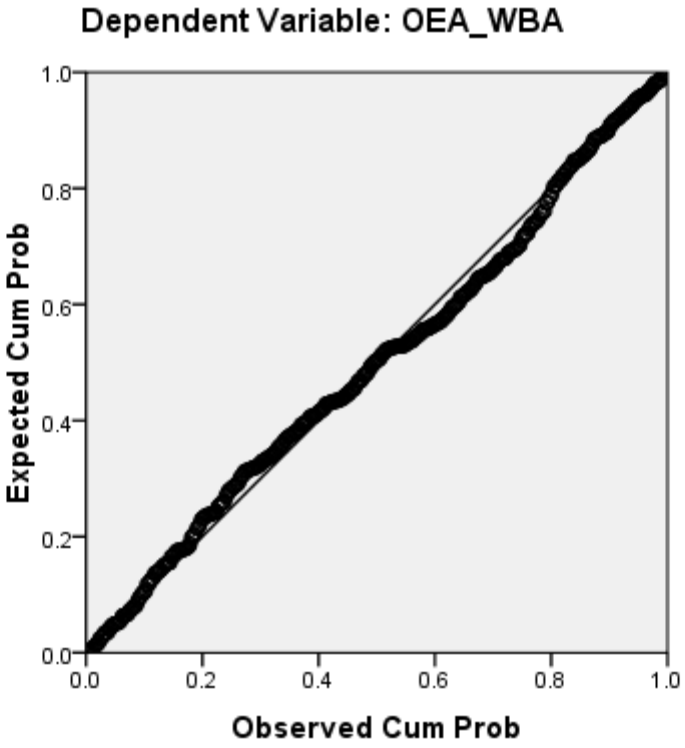
Histogram

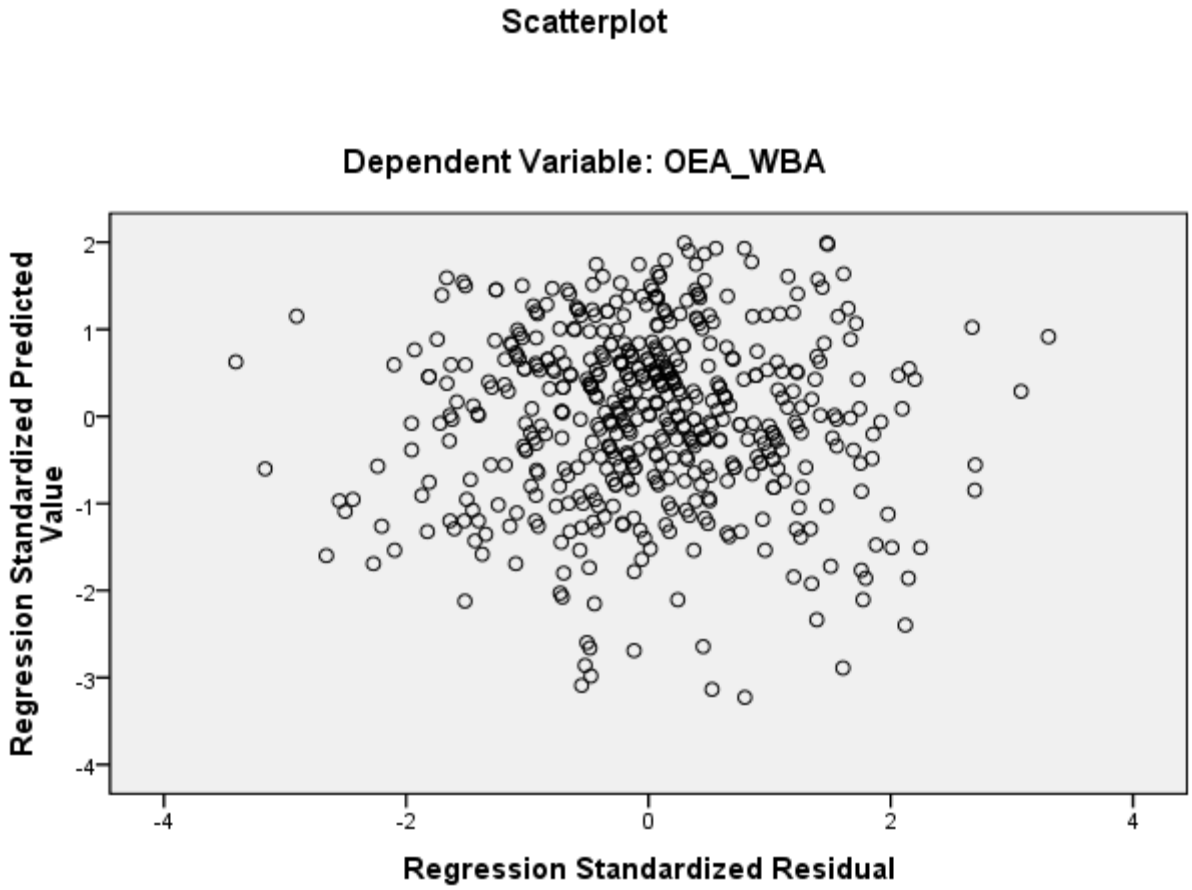

Dependent Variable: OEA_WBA
Mean =1.48E-15
Std. Dev. =0.998
N =523
Frequency
60
40
20
0
-4
-2
0
2
4
Regression Standardized Residual


Normal P-P Plot of SES
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Normal P-P Plot of Attendance
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

Normal P-P Plot of Regression Standardized Residual




Scatterplot
Dependent Variable: OEA_WBA
Regression Standardized Predicted Value
Regression Standardized Residual
2
1
0
-1
-2
-3
-4
-4
-2
0
2
4

APPENDIX I

REPEATED MEASURES ANALYSIS OF VARIANCE FOR PER PUPIL EXPENDITURES APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN DIVISIONS OF SIMILAR SIZE

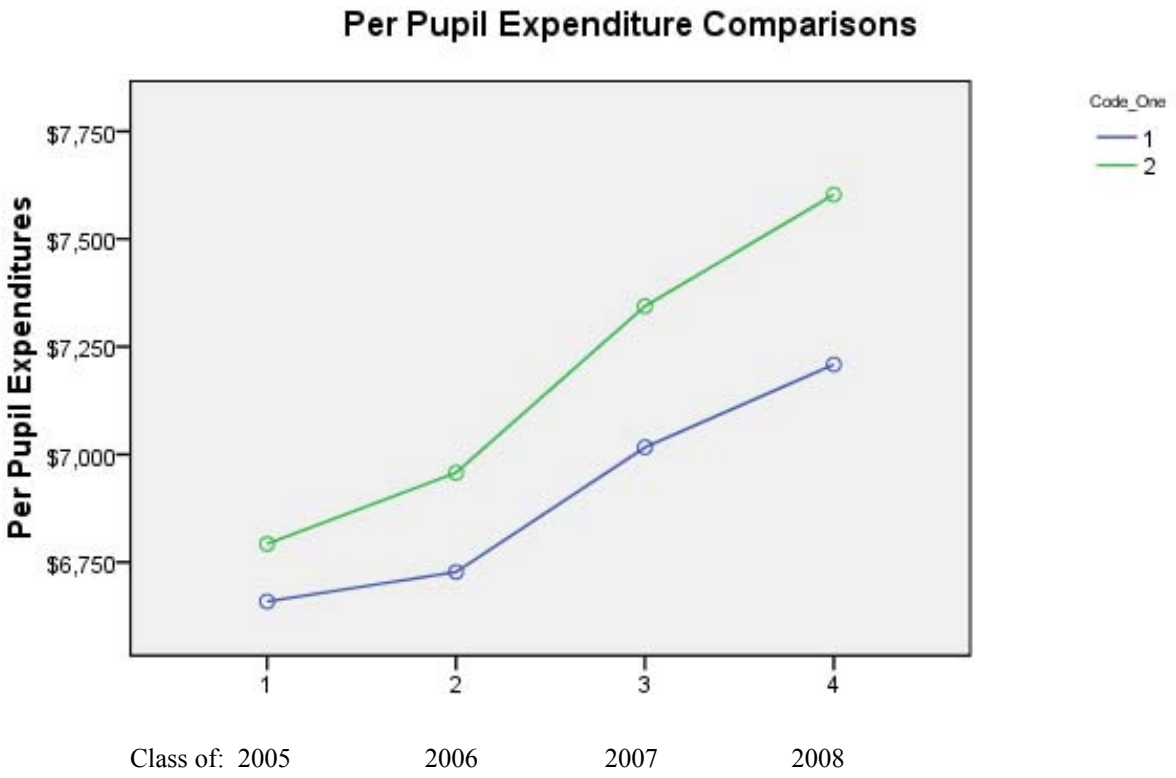
Codes: 1-Appalachian 2-Non Appalachian of Similar Size

Descriptive Statistics

	Code_ One	Mean	Std. Deviation	N
Five	1	$6,658.87	$738.535	31
	2	$6,792.44	$962.588	75
	Total	$6,753.38	$901.432	106
Six	1	$6,727.29	$775.625	31
	2	$6,957.69	$1,028.143	75
	Total	$6,890.31	$963.307	106
Seven	1	$7,016.61	$885.790	31
	2	$7,344.09	$1,134.745	75
	Total	$7,248.32	$1,074.274	106
Eight	1	$7,208.77	$875.966	31
	2	$7,603.00	$1,209.790	75
	Total	$7,487.71	$1,132.776	106

SS	Df	MS	F	P	η_p^2
School Divisions	1	1.739E10	4.495E3	.199	.016
Within	104	3868235.185			
Time	3	8521679.002	91.510	.000	.468
Divisions X Time	3	284478.524	3.055	.029	.029
Residual	312	93123.257			
Total	423				

Appalachian and Non-Appalachian of Similar Size



APPENDIX J

REPEATED MEASURES ANALYSIS OF VARIANCE FOR SOCIOECONOMIC STATUS APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN DIVISIONS OF SIMILAR SIZE

Codes- 1-Appalachian 2-Non-Appalachian of Similar Size

Descriptive Statistics

	Code_One	Mean	Std. Deviation	N
Five	1	.3842	.11893	31
	2	.3651	.16069	75
	Total	.3707	.14938	106
Six	1	.4003	.11297	31
	2	.3784	.16294	75
	Total	.3848	.14986	106
Seven	1	.4135	.11918	31
	2	.3895	.16486	75
	Total	.3965	.15275	106
Eight	1	.4300	.11955	31
	2	.4071	.17686	75
	Total	.4138	.16198	106

SS	Df	MS	F	P	η_p^2
School Divisions	1	.043	.457	.501	.004
Within	104	.093			
Time	3	.030	51.207	.000	.330
Divisions X Time	3	9.844E5	.166	.919	.002
Residual	312	.001			
Total	423				

APPENDIX K

REPEATED MEASURES ANALYSIS OF VARIANCE FOR ATTENDANCE RATES APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN DIVISIONS OF SIMILAR SIZE

Codes- 1-Appalachian 2-Non-Appalachian of Similar Size

Descriptive Statistics

	Code_One	Mean	Std. Deviation	N
Five	1	.9377	.01431	31
	2	.9375	.01669	75
	Total	.9375	.01596	106
Six	1	.9416	.01463	31
	2	.9289	.06212	75
	Total	.9326	.05305	106
Seven	1	.9416	.01344	31
	2	.9337	.01792	75
	Total	.9360	.01705	106
Eight	1	.9410	.01469	31
	2	.9360	.01677	75
	Total	.9375	.01628	106

SS	Df	MS	F	P	η_p^2
School Divisions	1	.004	2.557	.113	.024
Within	104	.001			
Time	3	.000	.231	.875	.002
Divisions X Time	3	.001	.817	.485	.008
Residual	312	.001			
Total	423				

APPENDIX L

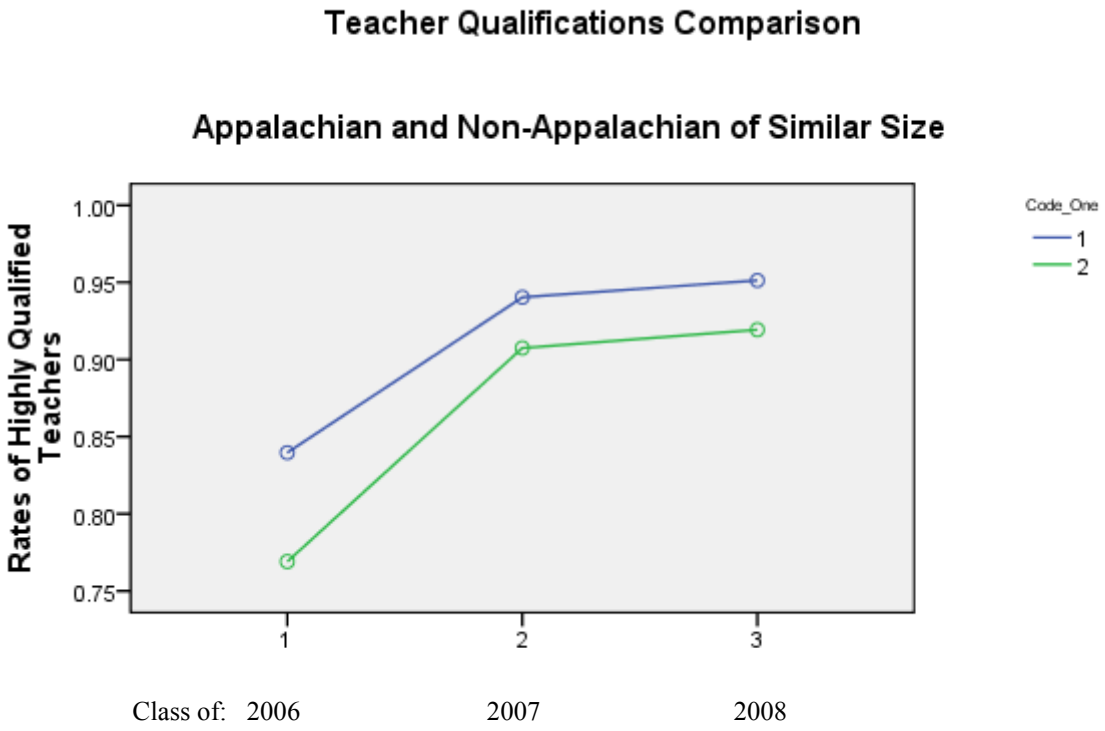
REPEATED MEASURES ANALYSIS OF VARIANCE FOR TEACHER QUALIFICATIONS APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN DIVISIONS OF SIMILAR SIZE

Codes- 1-Appalachian 2-Non-Appalachian of Similar Size

Descriptive Statistics

	Code_One	Mean	Std. Deviation	N
Six	1	.8397	.07477	31
	2	.7691	.11516	75
	Total	.7897	.10948	106
Seven	1	.9403	.04045	31
	2	.9075	.06574	75
	Total	.9171	.06115	106
Eight	1	.9513	.04241	31
	2	.9193	.06864	75
	Total	.9287	.06362	106

SS	Df	MS	F	P	η_p^2
School Divisions	1	.134	9.968	.002	.087
Within	104	.013			
Time	2	.462	183.988	.000	.639
Divisions X Time	2	.011	4.256	.015	.039
Residual	208	.003			
Total	317				


Teacher Qualifications Comparison
Appalachian and Non-Appalachian of Similar Size
Rates of Highly Qualified Teachers
1.00
0.95
0.90
0.85
0.80
0.75
1
2
3
Code_One
1
2
Class of: 2006 2007 2008

APPENDIX M

REPEATED MEASURES ANALYSIS OF VARIANCE FOR OEA RATES ACCOUNTING FOR THE NINTH GRADE BUBBLE FOR APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN DIVISIONS OF SIMILAR SIZE

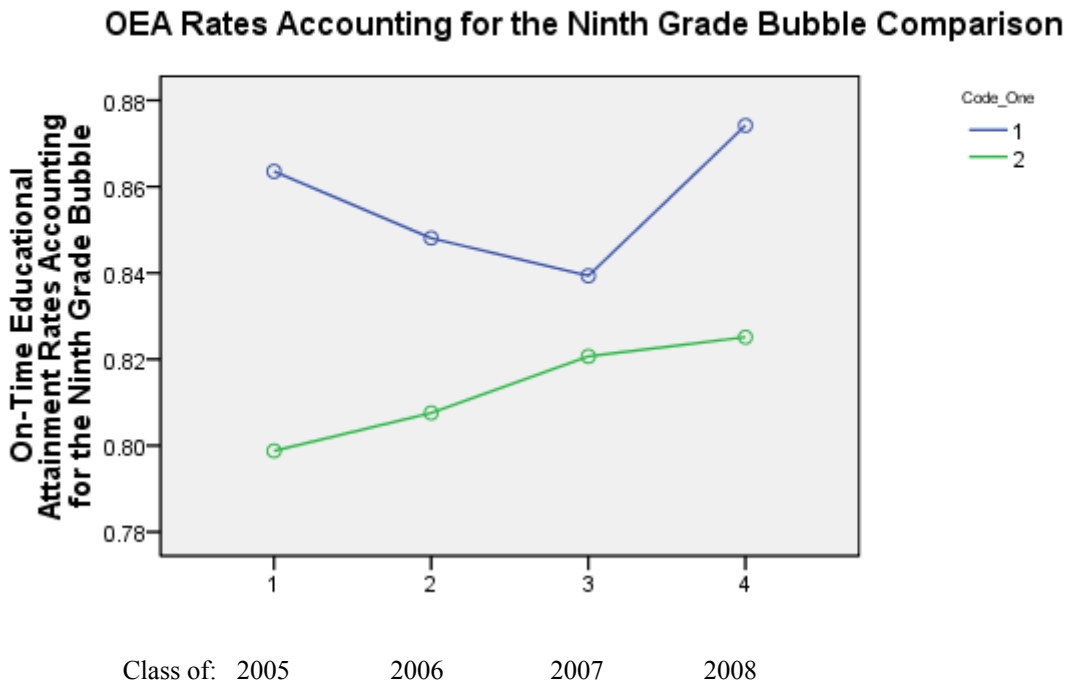
Codes- 1-Appalachian 2-Non-Appalachian of Similar Size

Descriptive Statistics

	Code_One	Mean	Std. Deviation	N
Five	1	.8635	.08491	31
	2	.7988	.08691	74
	Total	.8179	.09090	105
Six	1	.8481	.07031	31
	2	.8076	.09048	74
	Total	.8195	.08670	105
Seven	1	.8394	.08136	31
	2	.8207	.09234	74
	Total	.8262	.08926	105
Eight	1	.8742	.09003	31
	2	.8251	.09471	74
	Total	.8396	.09560	105

SS	Df	MS	F	P	η_p^2
School Divisions	1	.163	7.659	.007	.068
Within	103	.022			
Time	3	.009	2.733	.044	.026
Divisions X Time	3	.008	2.476	.061	.023
Residual	309	.003			
Total	419				

Appalachian and Non-Appalachian of Similar Size



Class of: 2005 2006 2007 2008

APPENDIX N

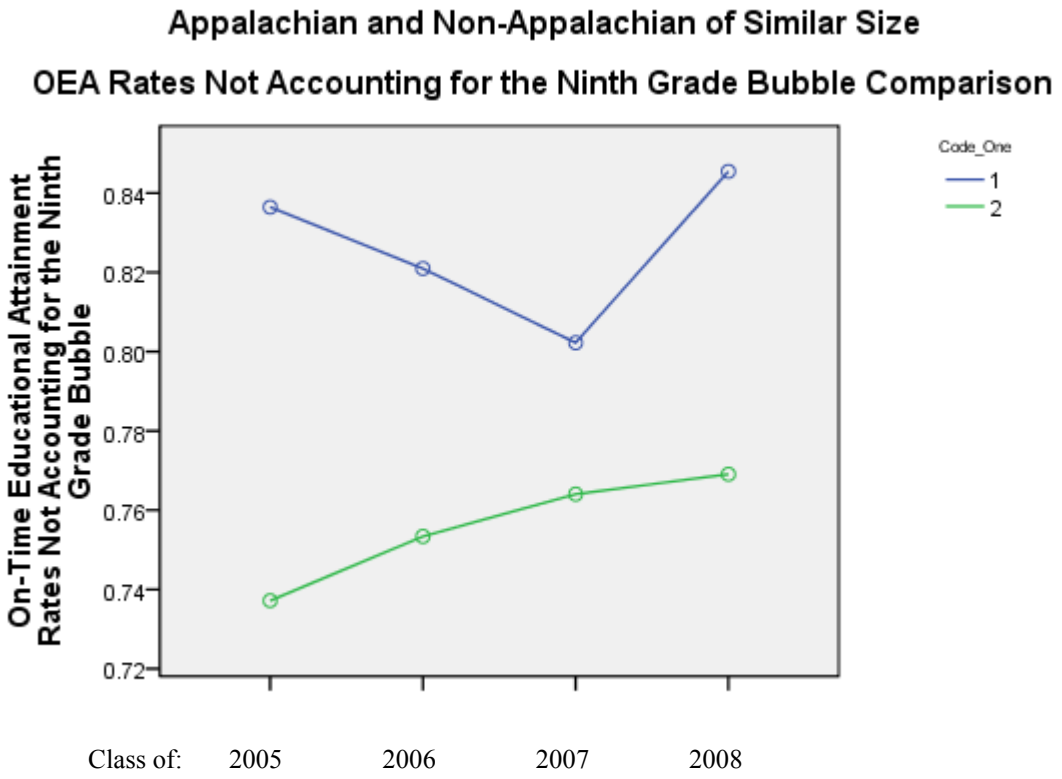
REPEATED MEASURES ANALYSIS OF VARIANCE FOR OEA RATES THAT DID NOT ACCOUNT FOR THE NINTH GRADE BUBBLE FOR APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN DIVISIONS OF SIMILAR SIZE

Codes- 1-Appalachian 2-Non-Appalachian of Similar Size

Descriptive Statistics

	Code_One	Mean	Std. Deviation	N
Five	1	.8365	.11137	31
	2	.7372	.10050	74
	Total	.7665	.11286	105
Six	1	.8210	.09053	31
	2	.7534	.10937	74
	Total	.7733	.10826	105
Seven	1	.8023	.09124	31
	2	.7641	.10545	74
	Total	.7753	.10254	105
Eight	1	.8455	.09896	31
	2	.7691	.11033	74
	Total	.7916	.11223	105

SS	Df	MS	F	P	η_p^2
School Divisions	1	.433	13.507	.000	.116
Within	103	.032			
Time	3	.010	2.753	.043	.026
Divisions X Time	3	.014	3.679	.012	.034
Residual	309	.004			
Total	419				


Appalachian and Non-Appalachian of Similar Size
OEA Rates Not Accounting for the Ninth Grade Bubble Comparison
On-Time Educational Attainment Rates Not Accounting for the Ninth Grade Bubble
0.84
0.82
0.80
0.78
0.76
0.74
0.72
Code_One
1
2
Class of:
2005
2006
2007
2008

APPENDIX O

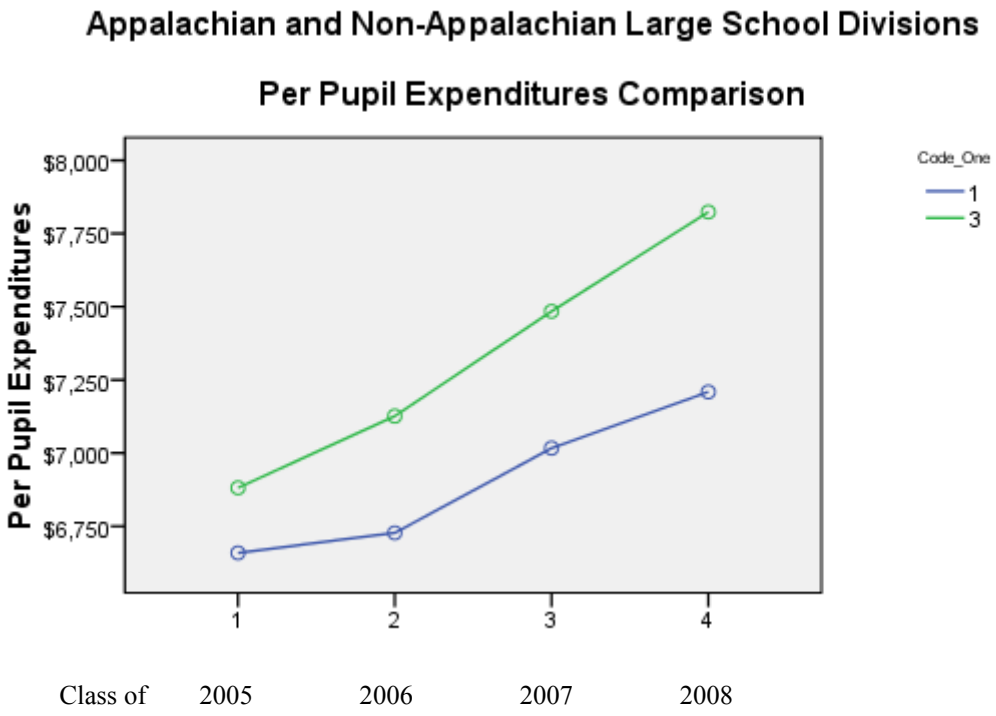
REPEATED MEASURES ANALYSIS OF VARIANCE FOR PER PUPIL EXPENDITURES APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN LARGE SCHOOL DIVISIONS

Codes: 1-Appalachian 3-Non Appalachian Large

Descriptive Statistics

	Code_One	Mean	Std. Deviation	N
Five	1	$6,658.87	$738.535	31
	3	$6,881.04	$1,414.199	25
	Total	$6,758.05	$1,087.492	56
Six	1	$6,727.29	$775.625	31
	3	$7,126.20	$1,576.240	25
	Total	$6,905.38	$1,205.132	56
Seven	1	$7,016.61	$885.790	31
	3	$7,484.24	$1,663.275	25
	Total	$7,225.38	$1,300.075	56
Eight	1	$7,208.77	$875.966	31
	3	$7,823.40	$1,887.490	25
	Total	$7,483.16	$1,438.120	56

SS	Df	MS	F	P	η_p^2
School Divisions	1	1.004E7	1.650	.204	.030
Within	54	6084804.974			
Time	3	6157637.073	83.715	.000	.608
Divisions X Time	3	367171.692	4.992	.002	.085
Residual	162	73555.133			
Total	223				



APPENDIX P

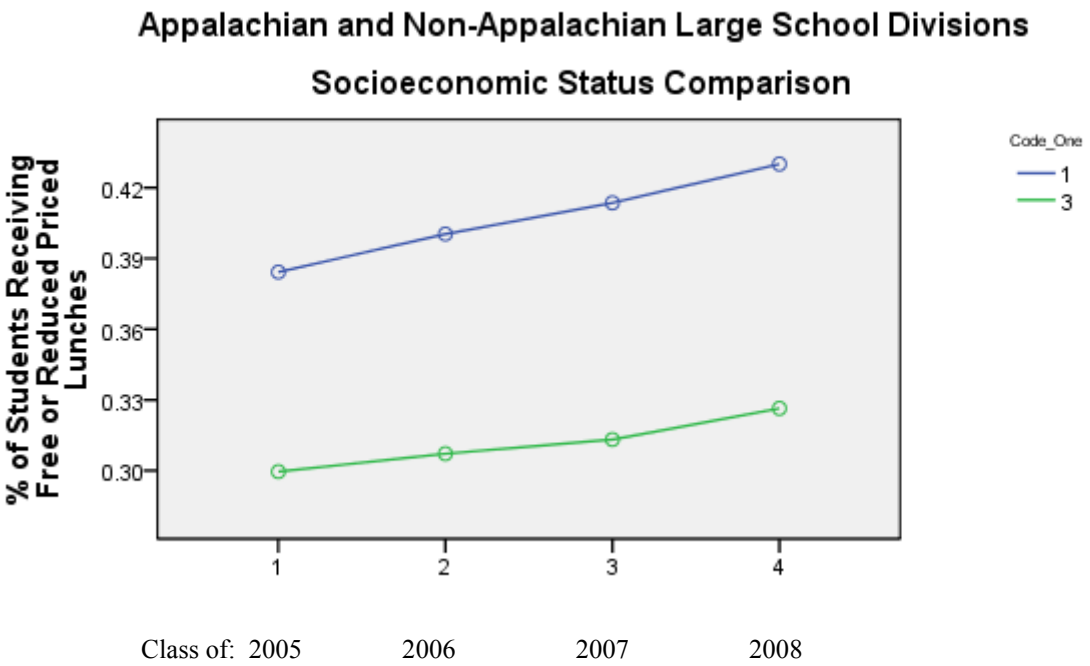
REPEATED MEASURES ANALYSIS OF VARIANCE FOR SOCIOECONOMIC STATUS APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN LARGE SCHOOL DIVISIONS

Codes- 1-Appalachian 3-Non-Appalachian Large

Descriptive Statistics

	Code_One	Mean	Std. Deviation	N
Five	1	.3842	.11893	31
	3	.2996	.16891	25
	Total	.3464	.14821	56
Six	1	.4003	.11297	31
	3	.3072	.17094	25
	Total	.3587	.14797	56
Seven	1	.4135	.11918	31
	3	.3132	.17134	25
	Total	.3687	.15196	56
Eight	1	.4300	.11955	31
	3	.3264	.17226	25
	Total	.3838	.15312	56

SS	Df	MS	F	P	η_p^2
School Divisions	1	.504	6.153	.000	.102
Within	54	.082			
Time	3	.013	50.266	.000	.482
Divisions X Time	3	.001	3.796	.012	.066
Residual	162	.000			
Total	223				


Appalachian and Non-Appalachian Large School Divisions
Socioeconomic Status Comparison
% of Students Receiving Free or Reduced Priced Lunches
0.42
0.39
0.36
0.33
0.30
1
2
3
4
Code_One
1
3
Class of: 2005
2006
2007
2008

APPENDIX Q

REPEATED MEASURES ANALYSIS OF VARIANCE FOR ATTENDANCE RATES APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN LARGE SCHOOL DIVISIONS

Codes- 1-Appalachian 3-Non-Appalachian Large

Descriptive Statistics

	Code_ One	Mean	Std. Deviation	N
Five	1	.9377	.01431	31
	3	.9364	.01977	25
	Total	.9371	.01681	56
Six	1	.9416	.01463	31
	3	.9364	.01846	25
	Total	.9393	.01650	56
Seven	1	.9416	.01344	31
	3	.9356	.01758	25
	Total	.9389	.01557	56
Eight	1	.9410	.01469	31
	3	.9356	.01805	25
	Total	.9386	.01634	56

SS	Df	MS	F	P	η_p^2
School Divisions	1	.001	1.271	.264	.023
Within	54	.001			
Time	3	3.857E-5	.627	.599	.011
Divisions X Time	3	6.238E-5	1.014	.388	.018
Residual	162	6.151E-5			
Total	223				

APPENDIX R

REPEATED MEASURES ANALYSIS OF VARIANCE FOR TEACHER QUALIFICATIONS APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN LARGE SCHOOL DIVISIONS

Codes- 1-Appalachian 3-Non-Appalachian Large

Descriptive Statistics

	Code_One	Mean	Std. Deviation	N
Six	1	.8397	.07477	31
	3	.8324	.07247	25
	Total	.8364	.07317	56
Seven	1	.9403	.04045	31
	3	.9464	.04386	25
	Total	.9430	.04173	56
Eight	1	.9513	.04241	31
	3	.9636	.02481	25
	Total	.9568	.03588	56

SS	Df	MS	F	P	η_p^2
School Divisions	1	.001	.105	.748	.002
Within	54	.005			
Time	2	.244	160.726	.000	.749
Divisions X Time	2	.001	.913	.405	.017
Residual	108	.002			
Total	167				

APPENDIX S

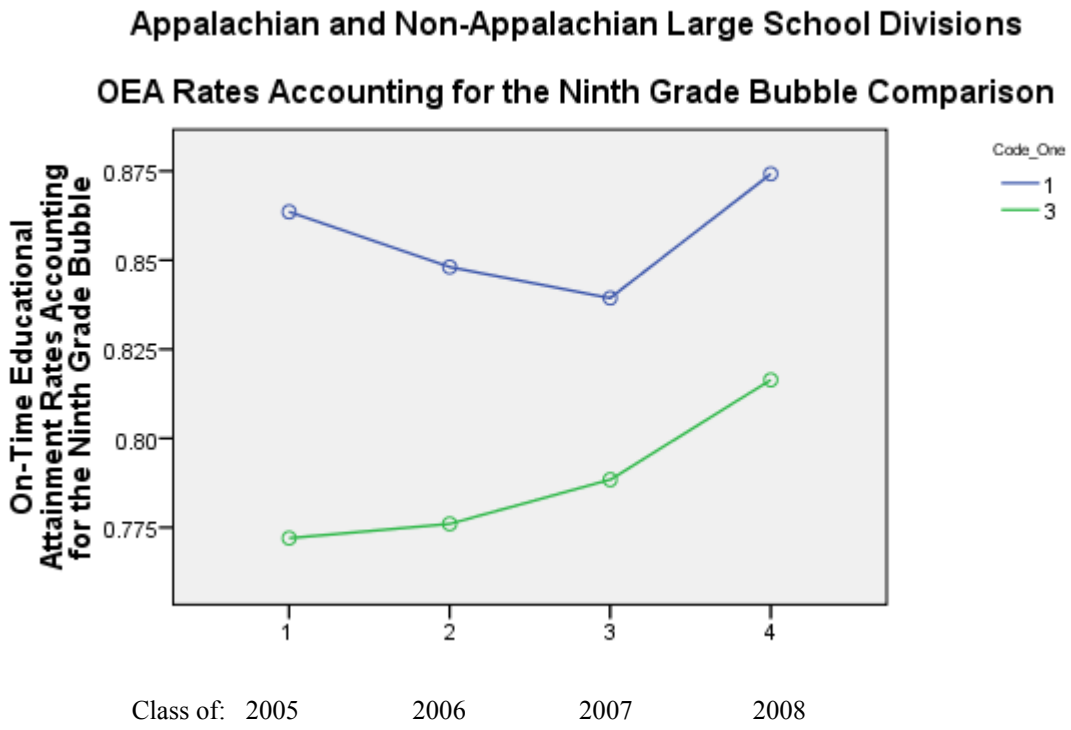
REPEATED MEASURES ANALYSIS OF VARIANCE FOR OEA RATES ACCOUNTING FOR THE NINTH GRADE BUBBLE FOR APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN LARGE SCHOOL DIVISIONS

Codes- 1-Appalachian 3-Non-Appalachian Large

Descriptive Statistics

	Code_One	Mean	Std. Deviation	N
Five	1	.8635	.08491	31
	3	.7720	.09170	25
	Total	.8227	.09854	56
Six	1	.8481	.07031	31
	3	.7760	.08362	25
	Total	.8159	.08399	56
Seven	1	.8394	.08136	31
	3	.7884	.08745	25
	Total	.8166	.08718	56
Eight	1	.8742	.09003	31
	3	.8164	.08015	25
	Total	.8484	.08980	56

SS	Df	MS	F	P	η_p^2
School Divisions	1	.257	11.325	.001	.173
Within	54	.023			
Time	3	.013	7.482	.000	.122
Divisions X Time	3	.004	2.489	.062	.044
Residual	162	.002			
Total	223				


Appalachian and Non-Appalachian Large School Divisions
OEA Rates Accounting for the Ninth Grade Bubble Comparison
On-Time Educational Attainment Rates Accounting for the Ninth Grade Bubble
0.875
0.85
0.825
0.80
0.775
1
2
3
4
Code_One
1
3
Class of: 2005 2006 2007 2008

APPENDIX T

REPEATED MEASURES ANALYSIS OF VARIANCE FOR OEA RATES THAT DID NOT ACCOUNT FOR THE NINTH GRADE BUBBLE FOR APPALACHIAN SCHOOL DIVISIONS AND NON-APPALACHIAN LARGE SCHOOL DIVISIONS

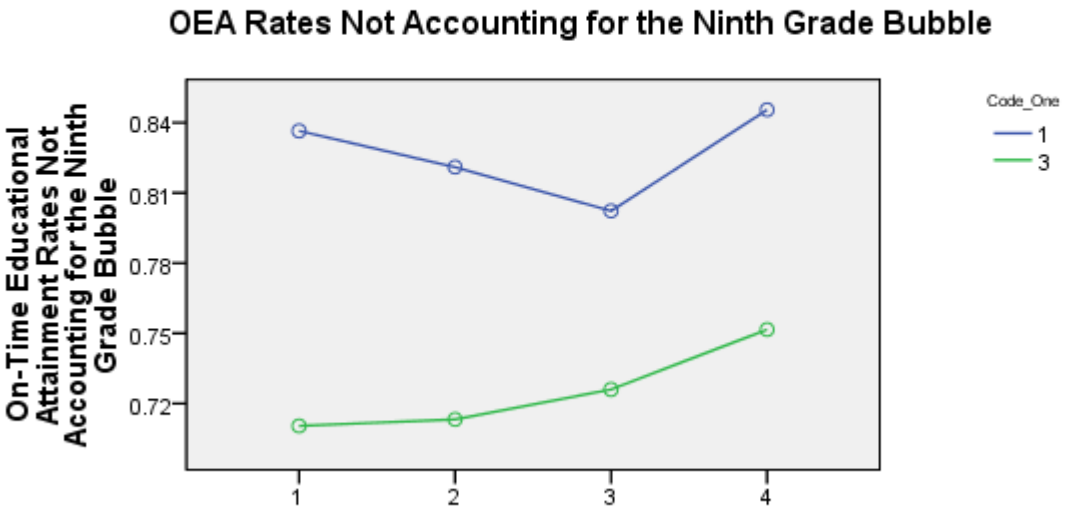
Codes- 1-Appalachian 3-Non-Appalachian Large

Descriptive Statistics

	Code_ One	Mean	Std. Deviation	N
Five	1	.8365	.11137	31
	3	.7104	.11494	25
	Total	.7802	.12857	56
Six	1	.8210	.09053	31
	3	.7132	.11239	25
	Total	.7729	.11360	56
Seven	1	.8023	.09124	31
	3	.7260	.12220	25
	Total	.7682	.11189	56
Eight	1	.8455	.09896	31
	3	.7516	.11643	25
	Total	.8036	.11608	56

SS	Df	MS	F	P	η_p^2
School Divisions	1	.565	14.486	.000	.212
Within	54	.039			
Time	3	.014	6.090	.001	.101
Divisions X Time	3	.006	2.768	.044	.049
Residual	162	.002			
Total	223				

Appalachian and Non-Appalachian Large School Divisions



Class of: 2005 2006 2007 2008

APPENDIX U

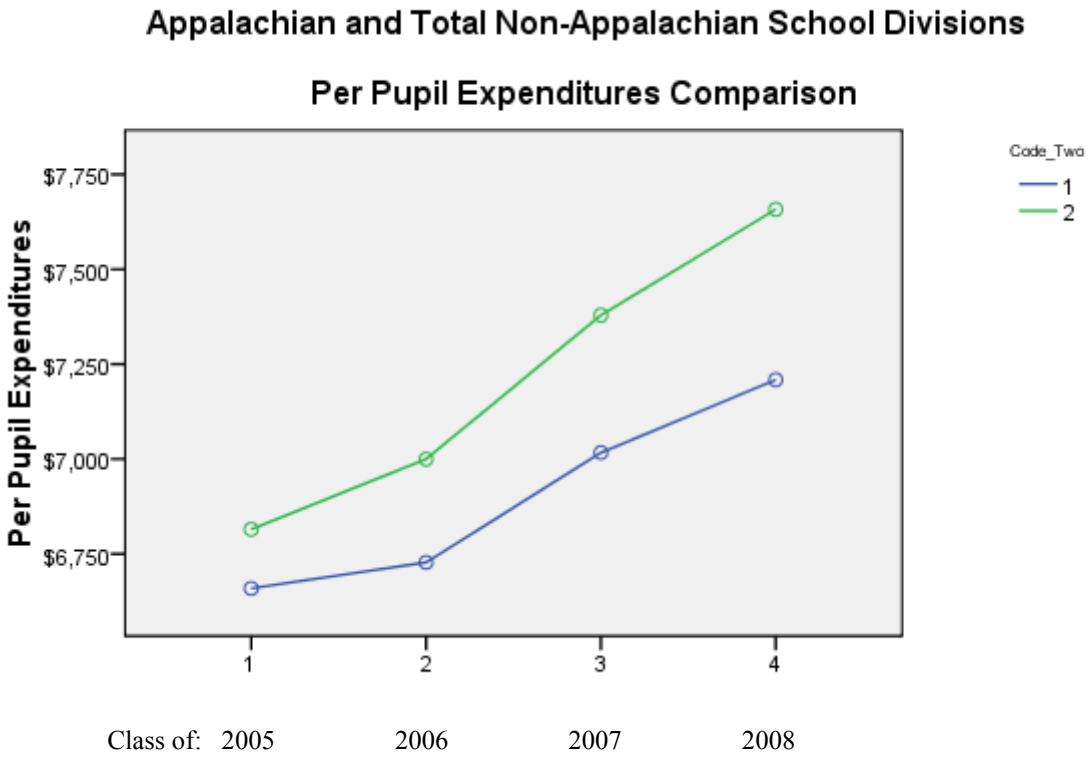
REPEATED MEASURES ANALYSIS OF VARIANCE FOR PER PUPIL EXPENDITURES APPALACHIAN SCHOOL DIVISIONS AND TOTAL NON-APPALACHIAN DIVISIONS

Codes: 1-Appalachian 2-Non Appalachian

Descriptive Statistics

	Code_One	Mean	Std. Deviation	N
Five	1	$6,658.87	$738.535	31
	2	$6,792.44	$962.588	75
	Total	$6,753.38	$901.432	106
Six	1	$6,727.29	$775.625	31
	2	$6,957.69	$1,028.143	75
	Total	$6,890.31	$963.307	106
Seven	1	$7,016.61	$885.790	31
	2	$7,344.09	$1,134.745	75
	Total	$7,248.32	$1,074.274	106
Eight	1	$7,208.77	$875.966	31
	2	$7,603.00	$1,209.790	75
	Total	$7,487.71	$1,132.776	106

SS	Df	MS	F	P	η_p^2
School Divisions	1	9097832.721	1.784	.184	.014
Within	129	5100114.265			
Time	3	9514235.801	105.438	.000	.450
Divisions X Time	3	373706.702	4.141	.007	.031
Residual	387	90235.565			
Total	523				


Appalachian and Total Non-Appalachian School Divisions
Per Pupil Expenditures Comparison
Per Pupil Expenditures
$7,750
$7,500
$7,250
$7,000
$6,750
1
2
3
4
Code_Two
1
2
Class of: 2005 2006 2007 2008

APPENDIX V

REPEATED MEASURES ANALYSIS OF VARIANCE FOR SOCIOECONOMIC STATUS APPALACHIAN SCHOOL DIVISIONS AND TOTAL NON-APPALACHIAN SCHOOL DIVISIONS

Codes- 1-Appalachian 2-Non-Appalachian

Descriptive Statistics

	Code_Two	Mean	Std. Deviation	N
Five	1	.3842	.11893	31
	2	.3487	.16440	100
	Total	.3571	.15516	131
Six	1	.4003	.11297	31
	2	.3606	.16700	100
	Total	.3700	.15643	131
Seven	1	.4135	.11918	31
	2	.3704	.16892	100
	Total	.3806	.15920	131
Eight	1	.4300	.11955	31
	2	.3869	.17834	100
	Total	.3971	.16691	131

SS	Df	MS	F	P	η_p^2
School Divisions	1	.154	1.546	.216	.012
Within	129	.100			
Time	3	.030	57.281	.000	.307
Divisions X Time	3	.000	.594	.620	.005
Residual	387	.00			
Total	523				

APPENDIX W

REPEATED MEASURES ANALYSIS OF VARIANCE FOR ATTENDANCE RATES APPALACHIAN SCHOOL DIVISIONS AND TOTAL NON-APPALACHIAN DIVISIONS

Codes- 1-Appalachian 2-Non-Appalachian

Descriptive Statistics

	Code_Two	Mean	Std. Deviation	N
Five	1	.9377	.01431	31
	2	.9372	.01741	100
	Total	.9373	.01668	131
Six	1	.9416	.01463	31
	2	.9308	.05456	100
	Total	.9334	.04835	131
Seven	1	.9416	.01344	31
	2	.9342	.01776	100
	Total	.9360	.01709	131
Eight	1	.9410	.01469	31
	2	.9359	.01700	100
	Total	.9371	.01657	131

SS	Df	MS	F	P	η_p^2
School Divisions	1	.003	2.443	.120	.019
Within	129	.001			
Time	3	8555E-5	.143	.934	.001
Divisions X Time	3	.000	.736	.531	.006
Residual	387	.001			
Total	523				

APPENDIX X

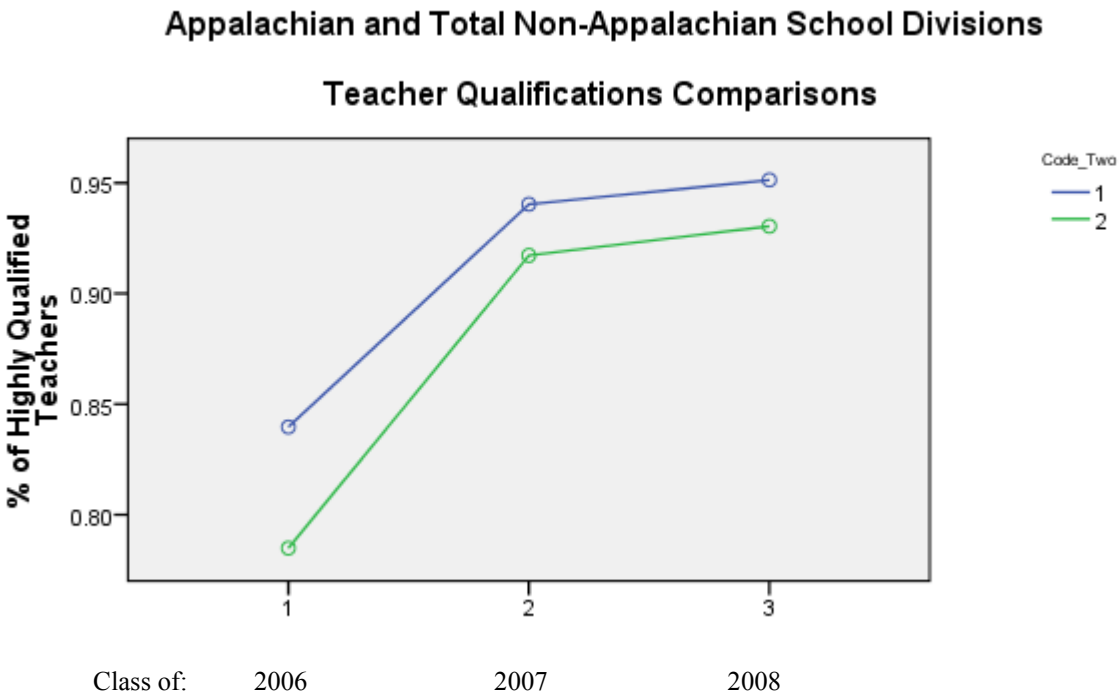
REPEATED MEASURES ANALYSIS OF VARIANCE FOR TEACHER QUALIFICATIONS APPALACHIAN SCHOOL DIVISIONS AND TOTAL NON-APPALACHIAN SCHOOL DIVISIONS

Codes- 1-Appalachian 2-Non-Appalachian

Descriptive Statistics

	Code_Two	Mean	Std. Deviation	N
Six	1	.8397	.07477	31
	2	.7849	.10930	100
	Total	.7979	.10457	131
Seven	1	.9403	.04045	31
	2	.9172	.06312	100
	Total	.9227	.05924	131
Eight	1	.9513	.04241	31
	2	.9304	.06358	100
	Total	.9353	.05977	131

SS	Df	MS	F	P	η_p^2
School Divisions	1	.077	5.949	.016	.044
Within	129	.013			
Time	2	.477	212.730	.000	.623
Divisions X Time	2	.009	3.791	.024	.029
Residual	258	.002			
Total	392				



Class of: 2006 2007 2008

APPENDIX Y

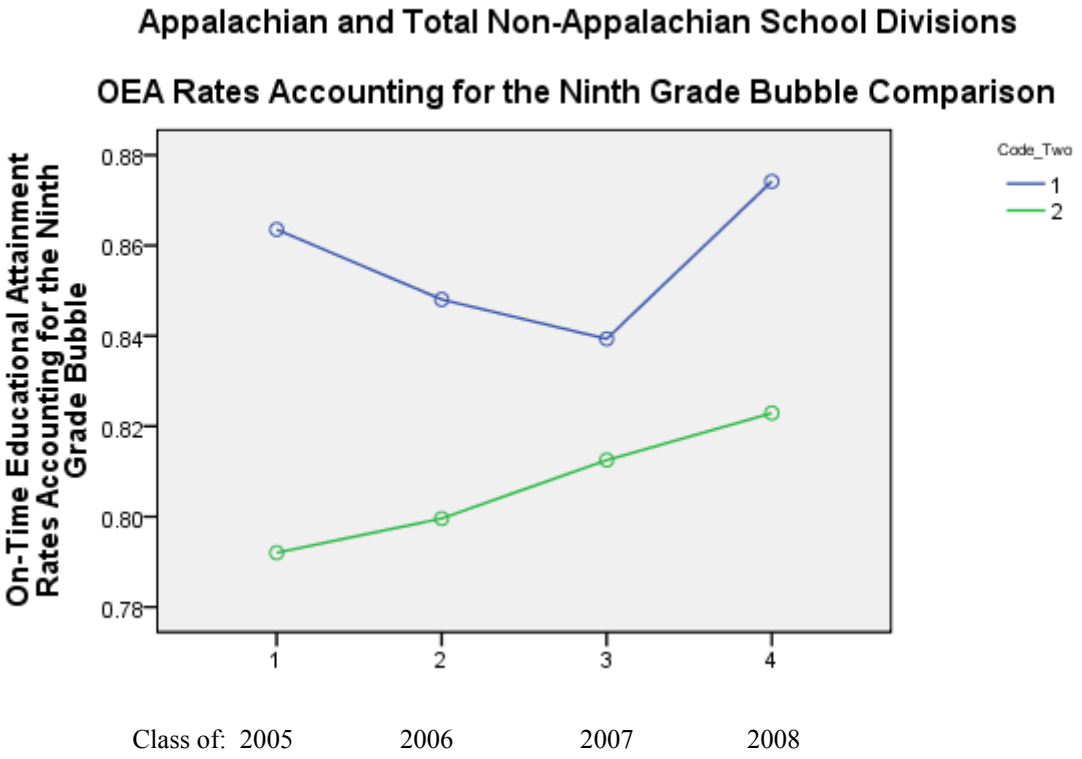
REPEATED MEASURES ANALYSIS OF VARIANCE FOR OEA RATES ACCOUNTING FOR THE NINTH GRADE BUBBLE FOR APPALACHIAN SCHOOL DIVISIONS AND TOTAL NON-APPALACHIAN SCHOOL DIVISIONS

Codes- 1-Appalachian 2-Non-Appalachian

Descriptive Statistics

	Code_Two	Mean	Std. Deviation	N
Five	1	.8635	.08491	31
	2	.7920	.08844	99
	Total	.8091	.09250	130
Six	1	.8481	.07031	31
	2	.7996	.08944	99
	Total	.8112	.08750	130
Seven	1	.8394	.08136	31
	2	.8125	.09178	99
	Total	.8189	.08983	130
Eight	1	.8742	.09003	31
	2	.8229	.09094	99
	Total	.8352	.09300	130

SS	Df	MS	F	P	η_p^2
School Divisions	1	.232	10.115	.002	.073
Within	128	.023			
Time	3	.012	4.491	.004	.034
Divisions X Time	3	.008	2.855	.037	.022
Residual	384	.003			
Total	519				



APPENDIX Z

REPEATED MEASURES ANALYSIS OF VARIANCE FOR OEA RATES THAT DID NOT ACCOUNT FOR THE NINTH GRADE BUBBLE FOR APPALACHIAN SCHOOL DIVISIONS AND TOTAL NON-APPALACHIAN SCHOOL DIVISIONS

Codes- 1-Appalachian 2-Non-Appalachian

Descriptive Statistics

	Code_Two	Mean	Std. Deviation	N
Five	1	.8365	.11137	31
	2	.7304	.10438	99
	Total	.7557	.11498	130
Six	1	.8210	.09053	31
	2	.7432	.11096	99
	Total	.7618	.11120	130
Seven	1	.8023	.09124	31
	2	.7544	.11053	99
	Total	.7658	.10787	130
Eight	1	.8455	.09896	31
	2	.7646	.11156	99
	Total	.7839	.11370	130

SS	Df	MS	F	P	η_p^2
School Divisions	1	.576	15.935	.000	.111
Within	128	.036			
Time	3	.014	4.319	.005	.033
Divisions X Time	3	.013	4.208	.006	.032
Residual	384	.003			
Total	519