Student Achievement in Ohio Charter Schools: A Comparative and Longitudinal Study

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This dissertation titled
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Abstract

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Student Achievement in Ohio Charter Schools: A Comparative and Longitudinal Study

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The purpose of this study was to investigate fifth-grade student achievement in Ohio public charter schools as compared to student achievement in traditional public schools, and to determine whether the performance of charter schools changed over time. Research questions asked 1) how does student achievement in Ohio’s public charters compare to that of traditional public schools, and 2) do Ohio’s charter schools show increased student achievement over time? Drawing on an approach used by Miron (2002; 2005; 2007), adjusted, or filtered scores were created by using the slope and intercept obtained from two regression models (one for reading and one for mathematics) that were performed with traditional public schools for each of the six years of the study. This approach allowed the investigation to control for the influence of student achievement predictors generally recognized in the research literature: socioeconomic status, ethnicity, special needs status, and school size. The result produced three measures for each of the schools: actual scores, predicted scores based on the adjustment for demographic variables and the computed difference between the actual and predicted scores. Score differences were then compared and analyzed over time to determine whether the gap between public charter and traditional public school achievement changed. As public charter schools matured, and as the number of operational public charters increased, T-test results confirmed that charter school performance in Ohio improved. In the sixth year
of the study, the level of charter school achievement approximated that of traditional public schools. Results of the study have policy implications regarding public charter school funding, methods to properly assess school-wide student achievement, and the equitable treatment of both public charter and traditional public schools with regard to sanctions related to student achievement outcomes. Further, study findings can be used to guide future research about public charter schools in terms of methodologies and research models that might extend the line of inquiry.

Approved: ________________________________

Jerry D. Johnson

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Dedication

This project is dedicated to my daughters, Andrea Kotler and Katheryne Kotler
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Perhaps most importantly, I want to express my appreciation for my parents, Charles and Marie, without whom none of this would have been possible. Married for seventy-four years, they continue to inspire me to learn, achieve, and serve others. See, Mom and Dad, I told you I would finish—and now I have done so. Rest in peace.
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Chapter 1: Introduction

Charter schools are a product of education reform efforts initiated in the late 1980s and early 1990s. They can be defined generally as non-sectarian public schools of choice that sign a contract or charter with a state agency guaranteeing positive academic results and adherence to their contract in exchange for relief from various state government statutes attributed to education (U.S. Charter Schools, 2011a). Intended to reform education through creativity and innovation, increase school choice for parents, and increase student achievement, charter schools have engendered strong feelings from both supporters and opponents. While proponents of charter schools have lauded their flexibility and creativity, critics have expressed concerns ranging from a fear that charter schools would skim cream of the crop students from traditional districts to apprehension that such schools could resegregate America’s public school students (Cobb & Glass, 1999; Mathis, 2009; Michelson, Bottia & Southworth, 2008; Miron, 2008; Rapp & Eckes, 2007).

Origin and Growth of Charter Schools in the United States

The concept of charter schools was proposed in 1988 in Minnesota by the President of the American Federation of Teachers (AFT), Albert Shanker, as a strategy for encouraging best practices within a traditional public school without the red tape commonly associated with educational institutions. The general belief was that a charter school would be akin to a laboratory school as popularized during earlier decades (Nathan, 1999). Shanker’s approach to charter schools was reportedly influenced by his reading of educator Ray Budde’s book, Education by Charter: Restructuring School
Districts (Budde, 1996; Kolderie, 2005; Nathan, 1999). In his book, Budde recommended giving innovative teachers a “charter” to create unique programs within their schools to better serve the needs of particular students. Shanker’s vision was to expand Budde’s concept to encompass entire schools within schools. Minnesota subsequently became the first state to pass public education choice legislation; in 1991, it passed the nation’s first charter school law as an alternative to traditional public schools or vouchers. Rather than existing as a “school within a school” as Shanker had proposed, Minnesota set the precedent for the nation by establishing charter schools as independent public schools. Two public, stand-alone charter schools opened in Minnesota during the 1992-1993 school year (Nathan, 1999).

Today, there are nearly 5,000 charter schools across the nation serving 1.5 million students (National Alliance for Public Charter Schools, 2010). According to the Annual Survey of America’s Charter Schools 2010 this represents a 21% increase in the demand for charter school slots over last year (Center for Education Reform, 2010). The report states that:

In fact, 65% of charter schools have waiting lists, up from 59% in 2008, and some school’s waiting lists are more than three times the size of the school themselves. The average-size charter school enrolls 372 students and estimates suggest the number of students on waiting lists would fill another 5,000 charter schools (p. 1).
The National Alliance for Public Charter Schools (2010) estimated the number of students on waiting lists to get into charter schools for the 2009-2010 academic year was 420,000 students.

In the generation that has passed through America’s schools since A Nation at Risk, student achievement in reading and writing has remained largely stagnant (Manegold, 1994; Wolk, 2009). Teachers complain of their lack of autonomy and creativity engendered by “teaching to the test” as a result of state standards and federal requirements. Minority and poor families accuse the expanding educational bureaucracy of providing an inferior quality of education to their children. (Finn, Manno, & Vanourek, 2006). According to Finn et al. (2006), charter schools are the “liveliest reform in American education”…due to their “potential to renew and redefine public education in the United States” (p. 14).

Support for Charter Schools

State Government Support. The rapid growth of charter schools in 41 states can be interpreted as evidence of state legislatures’ support for the initiative. In 1990, there was no charter school legislation; only a decade later nearly 2,000 charter schools were in existence (Renzulli & Roscigno, 2005). Charter school legislation spread across the nation in regions. After Minnesota passed the first charter school legislation in the U.S. in 1991, California followed suit in 1992, followed by New Mexico, Colorado, Wisconsin, Michigan, Georgia, and Massachusetts in 1993 (Center for Education Reform, 2005; U.S. Department of Education, 1998). Support by state governments for charter school legislation continued thereafter at an average of three states passing such laws each year.
through 2003. The years 1995 and 1996 saw the greatest increase in states’ passage of charter school legislation with eight and seven new laws approved, respectively (Center for Education Reform, 2005). At present, 41 states, the District of Columbia and Puerto Rico have passed charter school legislation; only nine states remain that have not (U.S. Charter Schools, 2011b). While some believe that governors and legislators jumped on the lower cost charter school bandwagon in order to prove they were serious about education reform (Bulkley, 2005; Bulman & Kirp, 1999; Parker-Burgard, 2009), others view the rapid pace with which states passed charter school legislation as a way to avoid what they perceived as a larger political threat: publicly funded vouchers (Henig, 1994).

**Federal Government Support.** From a Constitutional perspective, education is a state responsibility rather than a task assigned to the federal government. The tenth amendment states that “the powers not delegated to the United States by the Constitution…are reserved to the states.” Nowhere does the Constitution give power to the federal government to intervene in education. Nevertheless, federal support for increased school choice was first voiced in 1991 in *America 2000*, President George H.W. Bush’s education reform policy. Authored by Chester Finn of the Thomas B. Fordham Institute, and a proponent of charter schools, *America 2000* was conceptualized during a 1989 National Governors Conference in Virginia. The essence of *America 2000* was to create a “system of accountability that focuses on results, rather than on compliance with rules and regulations” (George Bush Presidential Library and Museum, 1989, p.1).
Adverse findings regarding the performance of American students as compared to students from other countries has increasingly been cited as the rationale for a growing and more intensive federal intervention in K-12 education (Bracey, 2008; Clinchy, 1998; Heise, 2006; Hersh, 2009). Congress first considered charter school legislation in 1992 but did not pass it (Harris, 2007). In 1994 President Bill Clinton signed *The Goals 2000: Educate America Act* (P.L. 103-227, 1994). The Act’s stated purpose was “to improve learning and teaching by providing a national framework for education reform” (p.1). As such, the Act authorized resources to states and communities for the purpose of ensuring efforts to help every student meet his or her full potential. Also in 1994, Congress appropriated $105 million for education which could be used by states for a variety of education improvement projects, including charter schools. Federal support for charter schools was demonstrated again in 1994 with the reauthorization of the *Elementary and Secondary Education Act* (ESEA), which provided start-up grant funds for charter schools (U.S. Department of Education, 1994). Then, in 1998, the federal *Charter School Expansion Act* was passed (U.S. Department of Education, 1998) which rewarded states having strong charter school laws with additional federal funds (Center for Education Reform, 1998; U.S. Charter Schools, 2011c).

In 2001 P.L. 107-110 or, the *No Child Left Behind Act* (NCLB), was signed into law. The primary provisions of NCLB included (1) stronger accountability for student achievement results; (2) more freedom for states and communities to use federal funds in the manner they deemed most appropriate for students; (3) an emphasis on using research-based educational methods; and, (4) more educational choices for parents,
including moving their child to a better performing school, access to supplemental educational services paid for by the district, and enrollment in charter schools (U.S. Department of Education, 2004).

President Barack Obama seemingly raised the stakes higher in June, 2009, when he proposed the goal of devoting “more than 3% of our GDP [gross domestic product] to research and development” including educational reforms (Obama, 2009, p.1). The President’s support for research and innovation is the cornerstone of his stated commitment to lead the world in scientific and technological innovation. Obama underscored the importance of research and innovation relative to charter schools when he announced his intention to increase the number of charter schools, based on research-based models of success. His backing for charter schools is further evidenced in a component of the 2010 Race to the Top (RttT) federal grant. Obama announced that states could competitively bid on up to $4.35 billion dollars if they raised or eliminated limits on the number of charter schools allowed in the state as well as passing other charter school-friendly policies (Democrats for Education Reform, 2009). The federal government currently appropriates approximately $200 million dollars annually through grant funds issued to state education agencies earmarked for charter schools (Siegel, 2008).

**Public and Parental Support.** Vergari (2007) noted that those with financial resources are able to make educational choices for their children that others cannot. Based on factors including personal preference, academic achievement and reputation of the school, shared value systems, safety issues, and location, those with the means to pay
for private school tuition frequently make choices other than the traditional public schools system. Some less affluent families also find a way to send their children to private schools, particularly families of urban public school teachers. In a 2004 study by the Fordham Foundation, researchers Doyle, Diepold, and DeScryver found that according to 2000 federal census data, 21.5% of urban teachers send their own children to private schools. In some cities the percentage was higher: in Milwaukee, for example, 29.4% of urban teachers sent their own children to private schools, compared to 12.2% of non-teaching parents across the states whose children attended private schools in 2000.

Public schools have been subject to increasing criticism for their low performance, unwillingness of teachers to use alternative strategies to teach students, archaic structure, and high per pupil expenditures (Kirkpatrick, 2009; Sarason, 1997). Meanwhile, charter schools are increasing in popularity among the public (Nathan, 2005). In 1991, the same year that the first charter school was founded, it was reported that public school parents were four times more likely to be dissatisfied with their child’s public school as compared to parents of students attending private schools (Benson & McMillen, 1991). During the charter school movement’s infancy, 44.6% of parents said “they would enroll their children in a private school if there were no financial obstacle” (Elam & Rose, 1995, p.1). Given such perceptions, it is not surprising that over the past five years, U.S. citizen support for charter schools has increased by 15%, to the point that nearly two-thirds of the public now approves of charter schools (Bushaw & McNee, 2009). Indeed, charter school enrollment continues to increase with many parents stating that they chose a public charter school for their child in the hope that the quality of
education would be better, and the environment safer, than was experienced in the local public school district (Hassel, 1998; Kleitz, Weiher, Tedin, & Matland, 2000).

Why do parents choose charter schools for their children over traditional public schools? According to some researchers, the most important element is academic achievement (Rose & Gallup, 2009; Schneider, Marschall, Teske, & Roch, 1998; VanderHoff, 2008; Wohlstetter, Nayfact, & Mora-Flores, 2008). According to Schneider and colleagues (1998), academic achievement and discipline concerns even take preference over racial diversity. VanderHoff (2008) cited an analysis of New Jersey’s charter schools that found a 10% increase in test scores resulted in a 60-100% increase in the numbers of students on charter school waiting lists. Also of interest was the finding that schools referring to an emphasis on academic excellence in their mission statements had waiting lists that were 75% larger than schools that did not focus on academics in their mission statements.

Wohlstetter and colleagues (2008), conducted a mixed-methods study which reported that 70% of parents whose children attended charter schools gave their child’s school an “A.” In 2009, in The 38th annual Gallup Poll of the Public’s Attitudes Towards the Public Schools, a similar question was asked among the parents of traditional public school parents: only 26% gave their child’s school an “A” (Rose & Gallup, 2009). Comments of parents participating in the study by Wohlstetter and colleagues focused on the positive learning environment and academic achievement. Other commentators have expressed concern that parents may not be qualified to make such decisions for their children, citing apprehension about information gaps in the education marketplace, fears
about how socioeconomic status influences parental choices, and issues of parental will or capacity to effectively evaluate school choices for their children (Van Dunk & Dickman, 2003; Vergari, 2007).

Evidence of public and, especially, parental support for charter schools is evidenced in both the growth of charter schools and in the waiting lists the schools maintain. According to VanderHoff (2008), “students enrolled in charter schools increased by 81% from 2002 to 2007, and the number of charter schools increased by 51%” (p. 479). Many other students would like to enroll in charter schools in their state, but cannot due to waiting lists and legislative restrictions on the number of charter schools permitted in the state (Robelen, 2008). The National Alliance for Public Charter Schools (2008) reported that approximately 365,000 students were on charter school waiting lists for 2007.

**Charter School Growth and Accomplishments**

According to Nathan (1999), the growth and accomplishments of charter schools have been bolstered by bipartisan support of recent U.S. Presidents. Presidential endorsement has resulted in congressional support that has provided millions of dollars for charter school start-ups, leading to increased educational choices for students and parents. Nathan quoted David Kirkpatrick, a senior education fellow at the U.S. Freedom Foundation who remarked that “going from 0 - 4200 schools and from 0 - 1.2 million students in a bit more than 15 years clearly indicates this is a school reform movement that will not be stopped” (p.1). Further, Nathan contends that talented, committed, nurturing teachers are finding their voices, and their creativity, within the charter school
movement and the increased achievement in many of these schools has also inspired reform in some traditional districts as well.

Others have contested the benefits and accomplishments of charter schools, citing evidence of increased ethnic segregation (Cobb & Glass, 1999), lack of academic progress (Bracey, 2005; Henig et al. 1999; Sass, 2006), and lack of demographic diversity (Lin, 2001). As a result of these findings, some critics believe a re-evaluation of charter schools is in order (Archer, 2000; Garcia, Barber, & Molnar, 2009; Sack, 2002; Wells, 1999).

**Introduction to the Research on Academic Achievement in Charter Schools**

**Precautions.** The substantial body of research about charter schools presents findings that are often mixed or inclusive. Much of the early research overtly reflects organizational affiliations and the researcher’s stance as either an advocate for, or critic of, charter schools. Further complicating the research about charter schools is the diversity in the schools themselves in terms of location, structure, size, focus, grade levels offered, and governance, making it difficult to formulate accurate comparisons. Finally, given the varied methodologies guiding the studies of charter schools, even research on the same topic often results in very different findings.

**Research on Overall Charter School Performance.** Charter schools promise to increase the academic achievement of students who attend their schools. That is one of the primary accountability measures charter school founders must agree to in exchange for being subject to fewer state laws than traditional public schools. Surprisingly, given
its attention in the media and the public discourse, only a limited number of research studies offer empirical findings regarding student performance.

In a study of lotteried-in and lotteried-out students attending charter schools in Chicago, Hoxby (2000) found that some charter school students scored higher than their traditional school peers, specifically white non-Hispanics, males, and students with a parent who has, at a minimum, graduated from high school. Hoxby later released a follow-up paper in which she compared charter students to the schools they would most likely otherwise attend (2004). She found that charter school students scored higher in both mathematics and reading and, further, that student’s scores improved the longer they were enrolled in the charter school. Critics of Hoxby’s second study cited its delimitation to Chicago (Renzulli & Roscigno, 2007) and the use of mathematics and reading proficiency rates as opposed to average scores for all students (Mishel, 2004).

Results from a 2003 U.S. Department of Education report indicated that charter school students were outperformed by their peers attending traditional public schools in the five states studied. Importantly, the report was based on an investigation that used case study methodology as a primary strategy. Case study methodology is not generally considered to be an appropriate research design for quantifying and comparing achievement performance levels due to issues of methodology, underlying assumptions about the role of the researcher, validity issues, sample sizes and research design (Creswell, 2005; Miles & Huberman, 1994). Given the methodological limitations, the report acknowledged that it is impossible to know why the charter school students were outperformed and questioned whether the findings were the result of actual school
In 2004, the National Bureau of Economic Research found that when charter schools existed in a nearby area, the traditional districts in that area improved their academic performance. Using end-of-year test scores for students in grades 3-8 from the state’s testing program, researchers reported that competition from the charter school was the sole factor in raising student achievement in the traditional district. Even when they accounted for the fact that, according to the researchers, higher level students were leaving for charters the increase in scores was approximately 1% which is equivalent to about a quarter of the average yearly growth (Holmes, DeSimon, & Rupp, 2004).

On November 13, 2003, the National Assessment of Education Progress (NAEP) report did not include charter school results, as previously promised. Instead, it was announced that a separate report would be forthcoming in January, 2004. The report release date was subsequently postponed again to June, 2004 and, later, to December, 2004. Frustrated by the repeated delays in the release of the NAEP Charter School Report, the American Federation of Teachers (AFT) conducted its own evaluation of charter schools using the 2003 NAEP online data and the web-based NAEP data tool. AFT researchers Nelson, Rosenberg, and Van Meter (2004) found that charter school students scored lower than traditional public school students at all grades and subjects except in cases in which the charter school was authorized by local schools boards; then the students at both charter schools and in traditional districts scored similarly. Given their organizational purpose, it would be reasonable to expect some bias.
The National Alliance for Public Charter Schools conducted a meta-analysis of 26 studies in 2005 and found that charter schools get better over time (National Alliance for Public Charter Schools, 2006). Given that the National Alliance for Public Charter Schools is a proponent of such schools, a predisposition to favorable study results may be expected.

Several studies have attempted to show learning gains for individual students by comparing the results of charter school students to the gains made in their traditional public schools (Bifulco & Ladd, 2006; Booker, Gilpatric, Gronberg, & Jansen, 2007; Hanushek, Kain, Rivken, & Branch, 2007; Sass, 2006). This body of work, in general, reported that charter school students outperformed their traditional school peers, particularly after the charter school had been operational for several years. These studies affirm findings by Hoxby (2004) indicating that the longer students were enrolled in a charter school, the higher they performed and also underscores the importance of the current longitudinal study.

Hassel and Godard Terrell (2006) completed an extensive review of 58 comparative analyses of charter school and traditional public school performance. Of the 58 studies, 17 were snapshots at particular points in time and provided limited use in understanding performance. The remaining 21 studies examined changes in student performance over time. Nine of the studies found charter school gains over traditional public schools; three studies found gains higher in certain categories at charter schools including at risk students and high school students; five studies found comparable gains
between charter and traditional schools, and three studies showed that charter schools lagged behind traditional public schools in terms of academic performance.

Seven of the studies Hassel and Godard Terrell reviewed inquired as to whether charter schools improved with age. Five of the seven studies found that as charter schools mature, they improve. The remaining two studies found no significant differences.

Conversely, a National Center for Education Statistics (NCES) study by Braun, Jenkins, and Grigg (2006), found that charter school students performed several points lower than their counterparts in traditional public schools, in both reading and mathematics on the National Assessment of Educational Progress (NAEP). Critics of the study point to problems associated with the use of free and reduced-price meal eligibility data, specifically that the measure has widely-acknowledged limitations as a proxy for socioeconomic status and that some charter schools do not offer free meals (Center for Education Reform, 2006). The strength of this study lies in the fact that NAEP data was used and is reliable. The weakness of the study was its measurement of a variable (free and reduced meals) that is not a reliable measure of socioeconomic status in charter schools.

In 2007, researchers Gary Miron, Chris Coryn, and Dawn Mackety of the Evaluation Center at Western Michigan University released the results of their longitudinal study comparing actual versus predicted gains made in traditional and charter schools in the Great Lakes States: Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. Their analysis of state testing data of fourth, sixth, and tenth graders from 2003-2007 found that although many charter schools have lower overall scores, the
residual gains (growth) scores of charter schools are higher, in some cases, than those found in traditional public schools. Results of the analysis in Ohio were inconclusive, in part due to missing or incomplete data available for the early years of the study.

In 2008, a national research project focusing on school choice, including charters, found that “there are large differences across school choice types in terms of the amount of research available, the overall quality of the research, and the conclusions the research supports” (Western Michigan University, 2008, p. 2). Further, it was noted that “the studies of student achievement in charter schools were the most numerous, although the quality of the evidence was mixed and the conclusion drawn from the evidence was that charter schools perform similar to traditional public schools.”

Taken as a whole, these studies indicate that the research on overall academic achievement in charter schools is inconclusive.

**Research on Student Subgroup Performance in Charter Schools**

An ongoing concern about charter schools has been whether they result in the re-segregation of public schools. Such a phenomenon may be the result of unintended consequences as when a family chooses a school with similar ethnic demographics or family values as their own, or may occur as a result of particular curriculum offerings in the school (Arsen, Plank, & Sykes, 1999; Cobb & Glass, 1999). Results of research on the topic are mixed. One study found that 70% of charter schools had ethnic compositions that resembled the nearest local school district (Research on Public Policy International, 2000). Another found a significant difference in racial demographics from the neighboring school (Cobb & Glass, 1999).
In 2003, Harvard University commissioned a study on the subject of charter schools and race (Frankenberg & Lee, 2003). Researchers focused on sixteen states with charter school populations greater than 5,000 students. Their findings were as follows:

- 70% of all black students attended a segregated charter school, compared to 34% of black traditional school students;
- Charters in the sixteen states studied have a disproportionately high enrollment of minority students although there are pockets of white segregation as well.

The conclusion of the researchers was that there was little effort at the state level to ensure racial balancing in charter schools through appropriate oversight or intervention, a finding they construed as problematic from a civil rights perspective. Certainly these findings suggest the need for a closer look, however consideration must be given to the fact that the first priority of charter schools is to raise academic achievement (i.e., desegregation and racial balancing has not been an explicit objective for charter schools).

Levy (2010) used diffusion analysis to examine the spread of various public policies and tested hypotheses relative to why and how the spread occurred in an effort to determine a possible explanation for the passage of charter school laws. Levy found that the passage of charter school legislation was highly influenced by teacher unions, per capita income in a state, and high school graduation rates. He suggested that poorer states with strong teacher unions were less likely to pass charter school legislation and that states with higher per capita incomes were more likely to pass charter school legislation, even if there was resistance from teacher unions. Levy also referenced higher graduation
rates in some states, noting that those states were less likely to enact charter school legislation. Levy found no correlation between charter school laws and race, however he surmised that perhaps the degree of integration within the public schools was a key factor in whether charter school legislation was enacted in a particular state. His conclusion was that “the opening of charter schools is perceived as a solution to the problem of increased political pressure towards school integration” (p. 50).

With regard to the performance of special education students in charter schools, very little research is available, particularly of a quantitative longitudinal design. In fact, most of the early studies about special education students enrolled in charter schools were inconsistent. Corwin & Flaherty (1995) and Finn, Manno, and Bierlein (1996) utilized primarily descriptive data to show that special needs students were overrepresented in charter schools. Conversely, the Pioneer Institute (1996) and the U.S. Department of Education (1997) found that percentages of charter school students eligible for special education services were either equivalent to percentages found in traditional public schools or were underrepresented. McLaughlin and Henderson (1998) used document reviews, surveys of charter schools, interviews and site visits to determine that a lack of information and resources were available to charter schools about special education services and the funding which supports it. One caveat in the McLaughlin study was that charter schools used an individualized approach to special needs students which seemed to help students who had experienced learning or behavioral problems in traditional public schools.
The available research on Limited English Proficient (LEP) students in charter schools is likewise extremely limited. Recent literature may explain why. A 2009 brief by Multicultural Education, Training & Advocacy (META) stated that most LEP students don’t even attend charter schools. Citing figures from Boston, they note that 20% of traditional public school students qualify for LEP services but only 3.8% attend charter schools.

Studies focused on economically disadvantaged students are similarly limited and report inconsistent findings. An article in the October 2004 issue of “NEA Today” claimed that according to the results of the NAEP, low-income and minority students perform better at traditional public schools than charter schools. Conversely, the National Governors Association Center for Best Practices (2009) reported that YES Prep, a charter school in Houston that serves a 95% minority student population with 80% low income status, claims that 91% of its students have graduated from college or are still enrolled in a four-year post-secondary program.

**Research on the Use of Residual Gains to Measure Academic Achievement**

Measuring student growth from one year to the next permits the design of school accountability systems that gauge the success of increasing student achievement. According to the Council of Chief State School Officers (CCSSO, 2008) one viable method of calculating growth is by using the residual gains method, a method that adjusts students’ current scores by their prior scores using linear regression.

Use of the residual gains method to accurately measure growth in the field of education is well established. The methodology has been used to measure the relationship
between funding and student achievement (White, 2001), the stability of teacher effects on student achievement (Rosenshine, 1970), and teacher and classroom context variables on student achievement (Wright, Horn, & Sanders, 1997). Ohio, and several other states, use a variation of the Tennessee Value-Added Assessment System (TVAAS) to measure student growth which includes a residual gains calculation (Sanders & Horn, 1998).

In the past decade, Miron and his colleagues have researched charter schools in a number of states using residual gains methodology including Connecticut (2002, 2005), Pennsylvania (2000, 2002, 2005), Delaware (2004, 2006, 2007), and the Great Lakes States (2007). Their results indicate that while overall scores may be lower in charter schools as compared to traditional public schools, growth from year to year is sometimes higher. The current study builds on their work, focusing exclusively on Ohio.

**Statement of the Problem**

While some research has been conducted on the academic achievement of students enrolled in charter schools, it can best be described as limited, inconclusive, and rarely longitudinal (Hassel and Godard Terrell, 2006; Lake & Hill, 2005; Miron, et al. 2007). Robust studies, comparing the academic performance of charter school students to their peers in traditional public schools, are scant. Current literature is divided on the issue of student performance in charter schools. Proponents of charter schools (Finn, Manno, & Vanourek, 2006; Kolderie, 1990; Meier, 2004, 2010; Nathan, 1999) clash with critics (Mooney, 2002; Mulgrew, 2010; Ravitch, 2010) on nearly every aspect of research examining student outcomes from the design of the study to the reliability of the results (Hassel, 1998; Hassel and Godard Terrell, 2006). Since the number of public charter
schools in the United States is steadily increasing as an alternative to student attendance in traditional public school districts, credible outcomes data must be available to assess academic performance in these schools. Comparing the academic performance of charter schools and traditional schools while accounting for demographic differences between the two will allow for determining whether schools are improving over time.

Moreover, in addition to understanding the overall academic performance of charter school students to their peers attending traditional public schools, it is important to examine the achievement of student sub-groups including economically disadvantaged, special education, and minority in order to ensure equal opportunities for all students.

Finally, augmenting the findings on student subgroup achievement are emerging issues relative to charter schools that relate to their ongoing sustainability. The controversy over whether charter schools are effective vehicles for increasing academic achievement over time is an integral part of the research, as is consideration of whether student subgroups are able to access the quality of education they are guaranteed by state law.

**Research Questions**

This study describes Ohio charter school performance in terms of raw scores and annual growth, compared to a group of demographically similar traditional schools over six years (2005-2011). Informed by the earlier work of Miron and colleagues (2000, 2002, 2005, 2007), the primary purpose of the research design for this study will be to observe and report on developmental trends of fifth grade charter school student achievement results over time.
Two primary research questions guide the study: 1) how does student achievement in Ohio’s public charter schools compare to that of traditional public schools in the state, and 2) do Ohio’s charter schools show increased student achievement over time?

Significance of the Study

The number of charter schools operating within the United States has rapidly increased since their inception in 1991. With over $200 million dollars being spent by the federal government on charter schools, 1.5 million students attending them, and only nine states in the nation without charter schools (Center for Education Reform, 2009), it is imperative that serious, accurate, longitudinal research is undertaken to understand student performance in charter schools versus their most likely district of enrollment.

In Ohio, the stakes are higher for public charter schools than in many other states. The passage of House Bill 1 (H.B. 1) in 2009 created an imminent need to assess the performance of charter schools in the state. H.B. 1 calls for the automatic closure of charter schools that do not meet the state’s criteria for adequate performance based primarily on academic scores. Studies by Miron et al. (2000, 2002, 2005, 2007) indicate that although raw scores may be lower than scores in traditional public schools, value-added growth in some charters is higher, when adjusting for demographic differences between public charter and traditional public schools. This fact may necessitate a revision in the Ohio law to incorporate adjustments for demographic differences and the use of residual gains analysis or a similar approach into the measurement of school-wide academic success.
Delimitations and Limitations of the Study

The study is delimited to the population of schools in Ohio from the years of 2005 through 2011. Since charter school laws vary considerably among the states, the advantage of delimiting to one state ensures consistency in both the achievement data and within the charter schools under consideration. However, since the study is delimited to the state of Ohio during particular years, results will not be immediately generalizable to other states or the nation as a whole.

A second delimitation is that the study focuses on the fifth grade Ohio Achievement Test (OAT) for the six years of the study. In Ohio, the number of elementary charter schools exceeds the number of operational middle and high schools. Since more elementary schools are therefore subject to the automatic closure provisions of H.B. 1, fifth grade was selected for the study.

Limitations of the study include confounding variables, situational variables, and mortality/differential attribution.

Confounding Variables. The practicalities of this model’s design do not allow for the inclusion of all relevant variables associated with school outcomes that may affect student achievement. These covariates include the influences of peers, a student’s own ability outside the influence of the instructional environment, teacher characteristics, and other characteristics of schools that also affect measured outcomes. According to Howley and Howley (2004), the inclusion of covariates such as student socioeconomic status (SES) and prior student achievement may be expected to greatly enhance the explained variance in the model. Moreover, the charter school designation represents a black box
variable that limits inferences due to the presence of covariates with size. Known
covariates attributable to size include greater opportunities for teacher collaboration, less
departmentalization, reduced alienation, and more heterogeneous groupings (Johnson,
2005). Given these constraints, a limitation exists in the ability of the study to detect and
describe relationships between key variables that may denote a proximal effect on student
achievement, thus creating possible threats to internal validity.

**Situational Variables.** This study is based on school-level, rather than student-
level analyses, therefore it is not feasible to fully control for student mobility or
differences within schools that may affect results. Use of the state’s performance test as
the measurement of student achievement further limits the study. At the present time, the
Ohio Achievement Test (OAT) at the elementary and middle school levels and the Ohio
Graduation Test (OGT) at the high school level are the most reliable and readily available
tools for gauging performance over time.

Finally, the study examines student outcomes at charter schools versus
demographically similar public schools. Individual student records were not used to
determine the precise traditional public school a student attended prior to enrolling in a
charter school since research indicates that most students attending charter schools do so
within their neighborhood or other close geographic proximity (Hoxby, 2004; Research

**Mortality/Differential Attrition.** Also, due to the longitudinal nature of this
study, a significant number of charter schools may have opened, or closed, between the
starting date of the study and the final stage of data analysis leading to a possible biased account of the observed differences in student achievement.

**Organization of the Study**

Chapter 1 has presented the introduction, statement of the problem, research questions, significance of the study, definition of terms, and limitations, delimitations, and assumptions of the study. Chapter 2 reviews literature and research related to the issues being investigated. The methodology and procedures used to gather data for the study are presented in Chapter 3. Results of analyses and findings to emerge from the study will be advanced in Chapter 4. Chapter 5 will include a summary of the study and findings, conclusions drawn from the findings, a discussion, and recommendations for further study.

**Operational Definition of Key Terms**

*Big 8* - The “Big 8” refer to Ohio’s eight largest school districts: Akron, Canton, Cincinnati, Cleveland, Columbus, Dayton, Toledo, and Youngstown.

*Charter School* – The North Central Regional Education Laboratory (1993) defines charter schools as “state-legislated, independent, innovative, outcome-based public schools” (p.1).

*Community School* – In Ohio, an institution typically termed a “charter school” in other states is called a “community school” in order to avoid confusion with private schools in the state, which also receive a charter to operate. Schools designated as *community schools* by the state of Ohio are public, non-profit institutions, not affiliated with a church or any other religious group, which are under contract with a state-
authorized sponsoring agency and are not directly affiliated with any traditional public school district.

*Ohio House Bill 1*- mandated the automatic closure of charter schools the state considers to be underperforming, primarily on the basis of academic scores. Beginning on July 17, 2009, Ohio Revised Code (ORC) 3314.35 closes schools based on the following: 1) For schools that do not offer a grade higher than 3, requires closure if the school has been in academic emergency for three of the four most recent years, instead of four years as previously mandated; 2) For schools that offer any of grades 4 to 8 but no grade higher than 9, requires closure if the school has been in academic emergency for two of the three most recent years, and has shown less than one year of academic growth in reading or math for at least two of the three most recent years; and 3) For schools that offer any of grades 10 to 12, requires closure if the school has been in academic emergency for three of the four most recent years, instead of three consecutive years with two years not showing academic growth in reading or math (Ohio Department of Education, 2009, p. 9-10).

*Student Subgroups* - No Child Left Behind defines subgroups as ethnicity (American Indian, Asian, Hispanic, Black, and White), limited-English proficiency, special education, migrant status, and free and reduced priced lunch (U. S. Department of Education, 2004).
Chapter 2: Review of Relevant Literature

Charter schools in the United States have generated interest among students and their families as an alternative to traditional public schools since their inception nearly two decades ago. Minnesota, in 1991, was the first state to pass charter school legislation. California followed in 1992. By 1995, 19 states had passed charter school laws; by 2003, that number had increased to 40 states, Washington D.C., and Puerto Rico. From 1999-2008, charter school enrollments more than tripled, from 340,000 to over 1.3 million. Today, more than 3,500 charter schools operate in the United States in 41 states, the District of Columbia, and Puerto Rico (National Center for Education Statistics, 2010).

The strongest demand for charter schools has been in urban areas, which is reflected in the top ten charter school communities based on market share of all public school students: New Orleans (57%), Washington, D.C. (36%), Detroit (32%), Kansas City, MO (29%), Dayton, OH (27%), Youngstown, OH (26%), St. Louis, MO (25%), Flint, MI (24%), Gary, IN (23%), Phoenix (22%), and Minneapolis (22%) (U.S. Department of Education, 2010). Much of the support for charter schools comes from claims that they meet diverse educational needs, increase student achievement, are more innovative than traditional public schools, provide safer, better learning environments for students (Fowler, 2003; May, 2006), and stimulate system-wide improvements (May, 2006; Nathan & Boyd, 2003).

Since 1994, the federal government has supported charter schools financially through its competitive grants program. In 2010, charter schools benefited from $256,031 million in federal dollars. States provide the largest share of public school funding,
charters included. Typically, public schools receive state funds to operate schools based upon a funding formula that varies among the states. A study that examined funding for charter schools across 16 states and the District of Columbia, which collectively enroll 84% of charter school students, found that charter schools receive approximately 22% less funding, per pupil, than the districts that surround them. For a typical charter school of 250 students, the shortfall is approximately $450,000, per year. Researchers noted that the funding gap between charters and traditional public schools appears to be wider in some urban areas like San Diego and Atlanta, where charter schools may receive up to 40% less funding than do traditional public schools. Fiscal inequity is most severe in Ohio, South Carolina, California, Georgia, Wisconsin, and Minnesota where charter schools experience a lack of access to local and capital funding (Thomas B. Fordham Institute, 2005).

Despite the fact that charter schools have received bipartisan support, their existence is the subject of substantial controversy. Sparking debates across the country, charter schools have been the subject of intense speculation as to their structure (Griffin & Wohlstetter, 2001; Smith & Wohlstetter, 2006), characteristics (Finn, Manno, & Vanourek, 2006; Vergari, 1999; Wayson, 1999; West, Ingram & Hind, 2006), and policies (Fusarelli, 2002; Hess, 2001; Holyoke, Henig, Brown & Lacireno-Paquet, 2006; Renzulli, 2005; Shober, Manna & Witt, 2006). While some view charter schools as the solution to America’s educational problems, others say they siphon off much-needed resources from traditional public schools and are the equivalent of funding private schools with public dollars (Albrecht, 2011; Green & Mead, 2003).
Interest in charter schools has produced numerous opinion pieces, journal articles, and technical reports about the nature of charter schools; in fact, a general search of charter schools in the United States yielded 201,000 entries. Narrowing the search to the years from 1995-2010 reduced the results to 19,900. A search of peer-reviewed literature on charter schools in the United States from 1995-2010 produced only 29 studies. Of the 29 peer-reviewed works, 14 examined state policy and legal issues, two reviewed special education topics, four dealt with the structure of charter schools, eight examined the various characteristics of the schools, and one study focused on cyber charter schools. The literature search performed for this study identified no peer-reviewed studies investigating student achievement in charter schools. Clearly the level of interest in charter schools has far outpaced scholarly research into their academic effectiveness.

Research concerning student achievement in charter schools across the nation has yielded mixed results over the years for a number of reasons. In the early years of the charter school movement, efforts at assessing student achievement were plagued by two challenges: access to quality data and newness of individual charter schools (Hassel, 2005; Miron, 2007). Although the charter school movement as a whole is still growing, in most states accurate data is now available due in part to the reporting requirements of the No Child Left Behind Act. As charter schools have matured, researchers have begun to have opportunities to assess performance results over time.

Research on the effectiveness of charter schools is mixed, making it difficult to draw conclusions about the success of the initiative in terms of improving academic outcomes. Additionally, the application of findings from individual studies (both state-
specific and national) to consideration of the larger questions of charter school effectiveness are complicated by the fact that the schools vary greatly from state to state in terms of their mission, funding, laws, policies, grades served and other related variables. Recently, a limited number of federally-funded studies have attempted to gauge the performance of charter schools versus traditional public schools by longitudinally examining randomized scenarios created when a population of students applies for more seats in a charter school than there are spaces available for enrollment. The resulting lottery automatically creates two control groups: one lotteried-in to the school and one lotteried-out of the school (Hoxby, Muraka, & Kang, 2009). Despite their improved rigor, findings from these studies reflect only the limited number of charter schools popular enough to have waiting lists for available seats in the school.

Researchers cannot observe the same student in two different learning environments (charter versus traditional public school) at the same time. Therefore, a counterfactual comparison must be made based on a given set of criteria. In the literature reviewed, charter school performance was generally assessed by examining: (1) results compared to students in a nearby public school with similar demographics (Bifulco & Ladd, 2006; Booker, Gilpatric, Gronberg & Jansen, 2004); (2) results compared to students remaining in the traditional public school from which the charter school student originated (Finch, Baker-Boudissa, & Cross, 2007; Gronberg & Jansen, 2001; Hanushek, Kain, & Rivkin, 2004); (3) virtual counterparts (Raymond, 2009); (4) value-added measurements taken before and after charter school enrollment (Greene, Forster, & Winters, 2003; Zimmer, Blanc, Gill & Christman, 2008); and, (5) students who were
lottered-in or lottered-out of a particular charter school (Hoxby & Muraka, 2007; Hoxby, Muraka, & Kang, 2009).

Each of these “counterfactual” comparisons has its strengths and weaknesses in terms of gauging charter school performance. For example, comparing the achievement of charter school students to students in the nearest public school seems to make sense. Further examination may reveal, however, that students who left the traditional public school may have more motivated parents, resulting in selection bias that affects study results. Similarly, creating a virtual twin of a charter school student in a traditional public school seems like a creative way to accomplish a counterfactual. The problem is that the characteristics of the virtual twin will not entirely match those of a live student. Despite the benefits of each of these designs, none provides an answer that can be generalized across all charter schools because individual schools and their students vary in their characteristics, both among charter schools across the nation and from the traditional schools in which students originated.

While some see charter schools as the answer to perceived shortcomings in public education in America, others view them as competition for public dollars. Implementation of the federal No Child Left Behind Act placed charter schools front and center in the educational debate. Language in the Act stated that ineffective traditional public schools could be converted into charter schools. That was perhaps the greatest catalyst for determining whether charter schools were performing at levels similar to traditional public schools. Additionally, at least ostensibly, charter schools traded fewer government regulations for accountability so the need arose to assess performance.
Indeed, the need for studies measuring the effectiveness of entire schools is relatively new. Prior to the advent of the charter movement, schools were assumed to be permanent. While researchers might have assessed the effectiveness of a particular program within a school, the level of functioning of an entire school was not considered. One of the difficulties in measuring performance that can be generalized across charter schools is no doubt the result of the newness of the initiative and the complexities inherent in the research design. Another may be a function of the possible biases and motivations of those who seek to promote the charter movement, or slow it down (Fickes, 2005; Greene, Forster, & Winters, 2003; Hanushek, 2010; Lake & Hill, 2005).

Selection Criteria for Studies Included in the Literature Review

This chapter reviews the extant literature about student achievement in charter schools. Initially 147 articles, working papers, studies, reviews, and other related texts pertaining to achievement in charter schools were examined for inclusion in this review. Selection criteria for inclusion in the review were guided by the following elements: (1) scientifically-based quantitative research and, (2) relevance to student achievement; thus articles, reviews, and summaries were discarded from further consideration. Focusing on 62 studies about student achievement in charter schools across the nation, the review explores and identifies gaps in the literature and provides a foundation upon which to interpret findings in the current research.

The selected studies vary considerably in terms of research design, data collection, methods, and analysis. A common way to categorize the research is according to the focus of the study and by type of data (Hanushek, Kain, Rivkin, & Branch, 2007;
In this literature review, each of the 62 studies is grouped into one of the following three categories: (1) Panel studies, (2) Cohort studies, and (3) Snapshot studies. The 24 panel studies selected for this review examine individual student data over time and may control for various school or student characteristics (Hassel, 2005). 20 cohort studies are included in the literature review which compare and contrast the achievement of groups of students over time. According to the National Alliance for Public Charter Schools (2009), cohort studies are not as powerful as panel studies in terms of comparing performance at charter versus traditional public schools because differences could be due to student composition rather than school level factors. The 18 snapshot studies included in the literature review provide a picture of student performance at one particular point in time. The research may highlight individual students or groups of students but it is limited to a single focus of academic achievement, thus making it impossible to measure growth for either charters or traditional public schools. Panel, cohort, and snapshot studies inform the literature review and ground the analysis about achievement in charter schools.

The literature review is divided into three sections. The first section provides a broad overview of the literature on the achievement of students enrolled in America’s charter schools based on whether the outcome results were negative, positive, or mixed. The second section examines the limited evidence on charter school performance since its inception using panel, cohort, and snapshot studies. The final section considers the achievement evidence about charter schools in Ohio, examining every known study conducted using data for the state. A chapter summary reviews the content and culls
elements from each section to make the argument for time (i.e., do charter schools improve over time?) as a relevant variable for investigating charter school achievement in Ohio.

Performance in America’s Charter Schools

Within the 62 studies included in the literature review, there is a fairly even distribution of works reporting higher, lower, or mixed achievement outcomes for charter schools as compared to traditional public schools. 18 of the studies indicated lower performance results; 23 found mixed results; and 21 studies indicated higher performance results for charter schools relative to traditional public schools.

Studies Finding Lower Performance Among Charter Schools. Negative performance studies provide an important element in understanding the complexities of start-up schools and the difficulty in assessing charter school impact on performance. Bifulco and Ladd’s 2006 panel study in North Carolina provided one of the first quasi-experimental studies of individual cohorts of students. Another first was the Loveless study (2002) from the Brookings Institute which was the first national study of charter school achievement. The cohort study by Miron and Horn (2000) of Michigan’s charter schools was one of the first charter school studies ever conducted. A recent snapshot study by the Institute for Education Statistics provides a random sample, with a twist.

Bifulco and Ladd. In 2006, Bifulco and Ladd released their research on North Carolina’s charter school initiative, which followed five cohorts of students from third grade (in 1996) through eighth grade or until the 2001-2002 academic year, whichever was earlier. The analysis considered math and reading performance on state exams. The
researchers reported that almost 9,000 students in the five cohorts attended a charter school during at least one of the years included in the study.

For their analysis, researchers constructed three models: a levels model, a gains model, and a fixed effects model. The levels model provides the difference in performance between charters and traditional public schools while controlling for observable student characteristics and grade-by-year effects. Among its limitations, the model does not take into account a student’s previous educational experiences. The gains model, as its name suggests, shows differences between the average test score gain made by students in each type of school. Its limitations include the fact that cumulative effects of student characteristics can create effect biases. The fixed effects model is similar to the gains model but it eliminates any unobserved student characteristics between schools that remain constant.

Results from the fixed effects model indicate negative effects of attending a charter school in North Carolina that were statistically significant and large, on both mathematics and reading. Further, although the negative effect was found to be largest in the first years of a charter’s operation, the negative effect persisted even among charters that were four or five years old. When analyzing results based upon the numbers of years enrolled, Bifulco and Ladd found that “the large negative overall effects appear to be driven largely, but not entirely, by the achievement of students during their first year in a charter regardless of the age of the school” (p. 22). They also pointed out that students who remained in charter schools beyond the first year did not exhibit accumulated negative impacts after their first year in the school.
This study did little to contribute to an understanding of charter school performance except to suggest that first year students experience a mobility gap in achievement when they change schools that is resolved in subsequent years. The study’s authors are clearly opponents of charter school initiatives. In their introduction they stated that “we conclude that the North Carolina school system has increased racial segregation, been detrimental on average to student achievement, and has widened the black-white score gap” (Bifulco & Ladd, 2006b, p. 2).

Loveless. In 2002, the Brookings Institute issued the results of what they termed the first national study comparing charter and traditional public school performance (Loveless, 2002). Using a multivariate analysis with school-level controls, researchers combined math and reading scores over three years (1999-2001) to form a composite achievement score for each of the 376 charter schools in the 10 states being studied. Next, since states use different achievement tests and they report test scores in different metrics, a z-score was computed for each of the schools which was subsequently examined on a national basis. Findings included an overall negative effect of -.24 z-scores, or approximately one-fourth of a standard deviation lower than performance in traditional public schools having similar demographic profiles.

Loveless pointed out that “selection effect” can either help or hinder charter school scores. The enrollment of low achievers will reduce overall test scores and, conversely, the presence of gifted or higher achieving students in a charter school will increase scores. Nationally, charter schools enroll greater numbers of student subgroups than do traditional public schools. In fact, Loveless found that enrollment in the majority
of charter schools are minority (52%), at-risk (50%), and low income (54%) students who traditionally experience an achievement gap in school. One of the reasons for the low scores among charter school students in the Loveless study, then, would be the larger enrollment of student subgroups. Another factor in the low scores may have been the newness of the charter schools themselves.

The following year the Brookings Institute released *Brown Center Report 2003* (Loveless, 2003). The report contained findings from a second study by Loveless, essentially expanding on the previous year’s research. Criteria for inclusion in the 10-state study were charter schools that were open in 2000 and had at least three years of data (through 2002). There were 569 charter schools in the sample. Math and reading scores were both examined as were test score changes from 2000-2002. The same procedure was followed, adjusting z-scores for race and poverty. The average z-score for charter schools in the study was -.31, indicating that charters scored significantly lower than traditional public schools with similar demographics. According to Loveless, in 2002 about 62% of schools had higher test scores than charter schools. With regard to test score changes over time, Loveless found that charter schools were improving at -.53 z-score in 2000, -.40 in 2001, and -.31 in 2002.

The Loveless study was one of the first to suggest that charter schools improve over time. The study was important for other reasons as well. The lead researcher, Loveless, is a former professor of public policy at Harvard University and the current director of the Brown Center at the Brookings Institute. He conducts research on a variety of educational topics. This particular study was cited by Roy and Mishel in critiquing
Hoxby’s work (Roy & Mishel, 2005) and in the Bifulco and Ladd (2006) research on charter schools.

**Miron and Horn.** Commissioned by the Michigan Department of Education (MDE), Miron and Horn (1999) used both formative and summative evaluation in qualitative and quantitative analyses. Several types of information were collected for the evaluation including a charter school survey and a school climate survey which was distributed to PSA staff, students and parents. Interviews were conducted with representatives of all stakeholder groups. Demographic data, financial information, and state test scores were analyzed for charter schools and their host districts. Finally, documents, school literature, and student work samples were reviewed. All charter schools in Michigan were evaluated except for those in southeastern Michigan (Detroit area) as dictated by MDE; 51 schools participated in the study which represented approximately half of all charter schools in the state. For the purposes of analyzing state exam scores, results from 1995-1999 were analyzed. Miron and Horn used a pre-post design with school-level controls, only. Results for math and reading at both the elementary and middle school levels indicated that traditional public school “host” districts scored higher than charter schools.

This study was important because it was one of the first studies of charter schools in the United States. Michigan’s charter school legislation passed in 1993. The first schools opened in 1994, thus data evaluated in 1995 reflects accumulated student performance from the previous school, as opposed to charter performance as it would not have had time to make any measurable impact. While one might anticipate that newly
formed charter schools would perform less capably than established traditional public districts, the study results could have provided additional insights about the students enrolled in Michigan’s charter schools if student controls had been used to consider prior achievement and student demographics.

Although Miron and Horn found that traditional public schools outperformed charter schools in Michigan when aggregated to the school level, their data tables reveal another facet: in many grade levels, charter schools outperformed traditional public schools in either mathematics or reading. Horn and Miron commented that these findings might be explained with the “opportunity to compare schools over a longer period of time and with the control of more background factors” (p. 88).

**Miron and Horn.** Miron and Horn revisited Michigan’s charter schools in 2000 to complete a five-year study for the Michigan Department of Education. Data from 1995-2000 annual state examinations were considered, using two types of analysis: (1) an analysis of all charter schools in aggregate as a group as compared with their aggregated host districts, and (2) a school-level analysis comparing changes in the percentage of students meeting state standards over two, three, and four years.

Findings were similar to the previous study: in general, host districts outperformed charter schools. In fifth grade science, charters scored better in aggregate than did the host districts. In addition, schools that opened in 1995-1996 had higher gains in fourth grade reading than host districts. Miron and Horn also remarked on the fact that school-by-school comparisons found many charters outperforming host districts.
The study is limited in the same ways as the 1999 research: since the schools were relatively new, opportunities were not available to consider state exam scores over time. Still, the study has merit in considering trends in charter schools over time and as an initial baseline of individual charter school performance.

**Miron and Nelson.** Miron’s research on the performance of newly emerging charter schools was not limited to Michigan. Miron and Nelson (2000) released the results of a cohort study of Pennsylvania’s charter school initiative just three years after charter school legislation passed and two years after the first schools opened. The study was commissioned by the Pennsylvania Department of Education (PDE) and was intended to provide (a) comparisons of charters with “district schools”; (b) an analysis of achievement trends over time; and, (c) comparisons with “like” non-charter schools. The first component was interpreted as encompassing all non-charter schools in the state. In Pennsylvania, district schools were viewed as those that sponsor charter schools. Trends over time were generated by comparing consecutive cohorts of students in their respective grade levels. Due to data limitations, the researchers were only able to conduct an analysis using state exam data for 31 out of a total of 48 charter schools opened by the start of the 1999-2000 academic year. Methods included a regression analysis that accounted for student demographic factors.

Findings were that charter schools as a group scored significantly lower in all subjects and at all grade levels than all non-charter public schools in Pennsylvania. The authors contended that such a comparison probably reflected differences in the types of students who chose to attend each type of school, rather than any impact charters had on
their students. The most promising data for charter school proponents was that in the analysis of change scores from year-to-year, charter school scores improved 105 points compared to host district’s improvement of 19 points, outpacing them by 86 points.

The study of Pennsylvania’s charter schools was critical in understanding trends and limitations of emerging charter schools: The commentary presented by Miron and Nelson regarding limitations of the study acknowledged issues of tracking data, timing, lack of achievement data, and data reporting parameters.

With regard to tracking issues, researchers pointed out that the state’s data system did not provide a way to track student achievement as they moved among schools, making an analysis of pre-charter student achievement levels impossible. Instead, researchers had to look at post-charter achievement at the end of 1997-98 and 1998-99, limiting the ability to distinguish between value added by the charter school versus the influence of various other factors.

Miron and Nelson (2000) also reiterated the fact that they were studying charter schools that had only been in operation for one or two years and discussed the varying reasons why start-up charter schools might not perform well. More importantly, they referred to empirical evidence from the Tennessee class size study (Grissmer, Flanagan, Kawata, & Williamson, 2000) which found that poor schooling in a “host” district can persist for years and the difficulty in counteracting the effects of prior poor schooling. Achievement analyses should consider whether potentially long periods of poor schooling can be overcome by the influence of charter schools within the first few years of operation.
Lack of achievement data was a third limitation of the study. For the 1998-99 school year, researchers were only able to obtain state data on 21 of the 31 charter schools in operation, either because the school didn’t offer grade levels that were tested or because of reporting issues. For the 1999-2000 academic year, researchers had reliable data for only 21 of the 46 charter schools in operation.

The manner in which data was reported in Pennsylvania was also problematic, according to the researchers. Since data is reported using means and quartile percentages, there is no way to determine within-school variations among students. Miron and Nelson (2000) pointed out the problem that can exist in small schools when a few very high or very low scoring students may make a very large impact on performance, leading to results that misrepresent performance among the population as a whole.

Miron and Nelson (2000) highlighted many of the difficulties in determining the impact of charter schools on student achievement, particularly in the areas of selection (characteristics of students enrolling in the school) versus value (the academic growth of students from year to year). Miron and Nelson (2000) said “the likelihood a given district will sponsor a charter school increases with increases in the concentration of poor and nonwhite students…charter schools tend to enroll higher concentrations of poor students than the Commonwealth’s public schools as a whole” (p. 151). For perhaps the first time, researchers acknowledged that charters were enrolling larger numbers of disadvantaged populations than their host districts and were cognizant of the importance of that fact when considering the performance impact of charter schools. An extensive research literature suggests disadvantaged populations would initially score lower on state exams
(Gleason, Clark, Tuttle, & Dwoyer, 2010; Grissmer et al., 2000; Miron & Nelson, 2000); in addition, the effects of working with disadvantaged populations may take much longer to counteract (Grissmer et al., 2000).

Finally, Miron and Nelson (2000) noted that even though the study found lower overall student exam scores in charter schools than in host districts, it also highlighted their potential: Confirming Hoxby’s (2004) finding that charter schools get better over time, the authors commented that students attending the state’s four oldest charter schools were scoring significantly higher than their peers in traditional public schools.

**Miron, Nelson, and Risley.** In 2002, Miron, Nelson, and Risley released their follow-up report on Pennsylvania’s charter school initiative considering data from 1999, 2000, 2001, and 2002. Key findings from the research analysis indicated (a) most charter schools scored well below the state average, and (b) charter schools appeared to have a modestly positive influence on student achievement. The researchers spent much of the balance of the report discussing how both findings could be true.

Over the period of study (1997-2002), the average charter school score on the state exam was a scaled score of 1160 versus 1300 for the typical host district. Only 13% of charter schools posted scores higher than their host district. The researchers noted that the achievement score was more reflective of student background characteristics such as family income, race, special education status, urbanicity, and other related variables; in other words *selection* factors. In order to estimate the value added by the charter school itself, researchers claimed it would be necessary to observe achievement growth in individual students. Due to the method in which Pennsylvania tracks its students it was
impossible to calculate value added in a direct manner. Instead, researchers had to construct a set of statistical filters that accounted for most of the changes in student background characteristics and apply the filters to study particular cohorts of students from one year to the next.

The model used by Miron, Nelson, and Risley to evaluate achievement in Pennsylvania’s charter schools was based on a sophisticated filter design to facilitate comparisons among charter schools and between charter and non-charter public schools. In order to make reasoned comparisons, differences among students must be considered. For example, comparison groups could be created that were based on the concentration of low income students in a particular school by regressing the annual state testing score against income for all non-charter public schools. The resulting regression line minimizes the distance between each data point to show the set of predicted pass rates for each level of income. Another way to conceptualize the regression line is to consider it as the set of mean annual state testing scores for comparison schools at each level of income. Then, to get the filtered score, Miron, Nelson, and Risley calculated the difference between the observed pass rate and the pass rate predicted by the model (Miron et al., 2002, p. F-9). The resulting figure is operationalized as the residual score, hence the method provides the means to describe the difference between the charter school’s pass rate and its demographically matched comparison group. If the predicted score is 1600, for example, and the observed score is 1550, then the residual is -50, meaning the school’s score was 50 points lower than the typical school within its demographic cohort.
In the case of Pennsylvania’s charter schools it was important to generate comparisons that considered more than one demographic independent variable such as income, race, special education status, and urbanicity since each of these elements can influence achievement results. Multivariate regression was used by Miron, Nelson, and Risley for this more complex task, using the same filtering methodology described earlier. Results provided a residual score for each grade and subject area in each charter school reporting state exam data.

In terms of reporting findings, the researchers were interested in observing changes in filtered scores over time (Miron et al., 2002, p. F-11). Several steps were undertaken to analyze and summarize trends in the filtered scores. First, aggregate filtered scores were created for each school by taking the simple unweighted average of filtered scores for each subject and grade. Next, a change score was calculated for each pair of consecutive years (i.e., 1997-1998 to 1998-1999). The change scores were subsequently averaged to produce annual average changes. These scores were used as a summary indicator of the achievement growth of each school relative to its comparison groups (Miron et al., 2002, p. F-11). Finally, the average of average annual gains across all charter schools was calculated (weighted by enrollment and the number of years in each school’s trend line) in order to obtain an overall summary estimate of growth for all of Pennsylvania’s charter schools. Reports included school-by-school data relating to filtered scores over time, filtered scores showing the difference between charter and their comparison non-chartered public schools, and specific data for individual schools including both actual and predicted scores, as well as the differences between the two.
Miron, Nelson, and Risley offer two advantages to the filters: first, the filtered scores “focus on the differences between each charter school and a specially selected comparison group of similar schools” (p. 149). Variables included in the filters were income, race, special education status, urbanicity, participation in the state examination, and school enrollment. Second, according to the researchers, the filtered scores provided a clear interpretation of results. A score of zero indicated that the charter school was performing equal to its comparison group. A negative score indicated the charter was performing below the comparison group; likewise, a positive score indicated performance higher than the comparison group. The downside of the approach was that because Pennsylvania does not test students every year, it was impossible to track particular cohorts of students from one year to the next; the best researchers could do was track comparisons of fifth, eighth, and eleventh graders annually, contrasted to subsequent groups of the same grades for the following years of the study.

The filtering system developed by Miron, Nelson, and Risley made a significant contribution to research investigating the impact that charters make on performance, even when considering the demographic characteristics of its students. Although the findings still indicated lower performance for charter schools, the performance gap was narrower with the filters in place. Researchers reported that the average charter school in Pennsylvania performed just slightly lower than its comparison group (by 36 points on a scale ranging from 1000-1600). Without filters accounting for demographic and geographic factors the score difference was 140 points lower.
Measuring changes in filtered scores over time, researchers found that 57% of charters with at least two years of state exam data showed positive trends in filtered scores, on average a 15-point gain. Comparisons of gain scores over time indicated that charter schools were narrowing the gap with traditional schools over time. Researchers predicted that the typical charter school would catch up to its comparison group within two to three years. Although not foolproof, results of the 2002 study in Pennsylvania using the filtered scores provided an enhanced view of charter school performance, considering demographic and geographic factors. In other words, it helped to distinguish between selection factors and the value each school was contributing to student achievement. This model was deployed in the current investigation.

*Institute for Education Sciences.* Researchers Gleason, Clark, Clark Tuttle, and Dwoyer of Mathematica Policy Research recently released a snapshot study evaluating the impact of charter schools upon 2,330 middle school students in 36 charter schools which held lotteries to determine admission (2010). The randomized control trial tracked both lotteried-in and the lotteried-out students for over two years. In order to be eligible for the study, charters had to enroll middle school students enrolled in grades 5-8. The researchers stated they had effectively accounted for the difficulties inherent in start-up school performance by only researching charters that had been open for two years. The schools had to be sufficiently popular such that they had more applicants than spaces available, creating the need for a lottery.

Charter school performance impacts were calculated by comparing average achievement outcomes of lottery-winners to those of lottery-losers over the two-year
period of time, controlling for student background characteristics. Researchers then estimated the overall performance impact by averaging across all sites, for both groups of students. Scores were converted to a comparable scale since scores from state to state vary in the way they are reported.

Findings were that charter schools in the United States did not have a statistically significant impact on achievement. Researchers reported a wide variation in scores from a minus .78 for one charter in math to a positive .53 for another. Evidence also pointed out that low achieving students, as well as those categorized as low socioeconomic status benefited from enrollment in charter schools in math, but not in reading.

Of note, the researchers offer as a caveat that the charter schools participating in the randomized trial were not typical of charter middle schools across the country in terms of race (i.e., the school enrolled fewer minority students) and socioeconomic status (i.e., the schools enrolled fewer economically disadvantaged students). This problematic limitation calls into question the generalizability of study findings. Further, the study found no relationship between race and performance or time and performance which is not consistent with findings reported in other studies (Barr, 2007; Loveless, 2003; Miron, Coryn & Mackety, 2007; Miron & Nelson, 2000; Miron, Nelson, & Risley, 2002; Public Impact, 2009; Raymond, 2009; Sass, 2006; Zimmer, Blank, Gill, & Christman, 2008; Zimmer, Gill, Booker, Lavertu, Sass, & Witte, 2009).

Pioneering charter school researchers pointed the way forward for future performance studies. In Bifulco & Ladd (2006) and Loveless (2002), researchers learned that studying new schools (1-2 years in operation) resulted in lower achievement scores
among charter school students due to start up and mobility factors, versus emerging schools (3-5 years in operation) and mature schools (over 6 years in operation). Similar results were found in Texas when the research team discovered that start-up charter schools experienced greater challenges in raising achievement than established charter schools; in fact, in some older charter schools, low-income and at-risk students outperformed similar students in traditional public schools on the Texas Assessment of Academic Skills (Texas Education Agency, 2001, 2002). Categorizing results by the age of the charter school is a prominent feature of the current study.

**Research Studies Finding Mixed Results.** Slightly more studies included in this review found mixed results in research exploring the academic performance of charter schools and representatives of panel, cohort, and snapshot studies are presented in this section. The Florida Department of Education Office of Independent Education and Parental Choice (2006) study is interesting because it revealed more than simply mixed results; it also explored the reasons why. Greene, Forster, and Winters (2003) were the first to study similar groups of students from both traditional and charter schools. The methodology they used provides insights into how researchers might best measure charter school performance. Finally, Betts and Tang (2008) review 41 studies; their insights are critical in guiding research efforts and interpreting results.

**Office of Program Policy Analysis and Government Accountability.** In 2005, the Florida Legislature’s Office of Program Policy Analysis and Governmental Accountability released a panel study with respect to charter school achievement in Florida. A longitudinal multivariate analysis was conducted that included both student
and school-level controls. Math and reading scores were analyzed for charter school versus traditional public schools from 1998-2004.

Findings indicated that in math, elementary students showed lower gains than their traditional public school counterparts. In middle school, similar gains were found between both groups. At the high school level, higher gains were made in math and reading among charter schools than traditional public schools, particularly among students who were the furthest behind. Researchers stated that on average, charter school students were academically behind their peers in the traditional public schools they left.

While only about one-third of the charter schools met state grade-level expectations as reflected on the state’s exam, these schools outpaced traditional public schools in student learning gains. Another two-thirds of the charters did not meet state expectations; of these, about one-half made larger learning gains than comparable students at other charters or traditional public schools. At the remainder of the charter schools, students fell further behind peers at traditional public schools.

This report was one of a series of reports designed to provide the Florida Legislature information to review charter schools as required by law. The Florida charter school legislation passed in 1996; therefore some of the charter school included in the study may have been newly formed. This study helped to explain why two-thirds of the state’s charter schools were making a positive performance impact in terms of larger learning gains from year to year, despite the fact that some of the student exam scores did not meet state expectations.
Greene, Forster, and Winters. Researchers (2003) from the Manhattan Institute for Policy Research studied cohorts of charter schools versus matched traditional public schools (as opposed to districts) within eleven states (Arizona, California, Florida, Texas, Michigan, Wisconsin, Ohio, Colorado, North Carolina, Minnesota, and Pennsylvania) over a one-year period of time.

Focusing on reading and math test scores, the researchers excluded charter schools that targeted specific populations of students, such as advantaged or disadvantaged students. Cyber and conversion charter schools were also excluded in an attempt to focus study results on similar students attending similar schools. Researchers compared year-to-year test score changes for the most recent two years in charter schools versus their nearest traditional public school, using each school’s average scale or percentile rank. A regression analysis was used to measure score changes for math and reading. Controls were used for charter school status and race. After each state was analyzed the data was combined and a national analysis was performed, controlling for each state.

State results were mixed with charter schools often outperforming traditional public schools. Greene, Forster, and Winters reported that the highest performing states in the study were Texas and Florida. In Texas, math scores were seven percentile points higher than traditional public schools; in reading, scores were eight percentile points higher. In Florida, the gains for charter school students over traditional public school students were about six percentile points. On a national basis, charter students
outperformed traditional public students by about three points on math tests (for a student starting at the 50th percentile) and by about two points on reading tests.

This study was vital to understanding charter school performance because it was the first national study that compared similar groups of students attending charter and traditional public schools. Additionally, the text of the study included useful information about the difficulties inherent in many types of study designs with regard to measuring charter school performance, particularly the issue of comparing charter schools with school districts. According to Greene, Forster, and Winters, charters are much more comparable to their nearest public school because a district is apt to contain greater diversity in both student background and geographical features, each of which has bearing on performance scores. Further, they pointed out the necessity of examining year-to-year score changes to filter out some of the student and family background characteristics that influence achievement scores.

Interestingly, these researchers were the first to point out that a randomized individual student study based on lotteried-in and lotteried-out students would be the most accurate means of determining charter school performance. Although they identified the means in 2003, it wasn’t until 2009 that a study actualized their model (Hoxby, 2009).

**Betts and Tang.** In 2008, researchers Betts and Tang of the Department of Economics at the University of California, San Diego released their scientific study of the literature that used either lottery methods or value-added models to determine charter
school performance. Betts and Tang devised strategies to test whether charter schools outperformed or underperformed traditional public schools and to what degree.

Betts and Tang used Fisher’s inverse Chi-squared test to determine whether any of the results across the studies were positive or negative. For both math and reading, test results showed that some students underperformed in charter schools and some student outperformed, relative to their peers in traditional public schools.

At the elementary level, tests indicated that some charter school students outperformed in reading and none underperformed. For math, the results were mixed. When middle school student results were added in with elementary results, the results were mixed for both math and reading.

At the middle school level alone, mixed results were found. For math, positive results were shown. When high school results were added to middle school results, there was a high probability of no negative results on reading, but there was a greater likelihood of negative results in math.

At the high school level alone, the study reported mixed results, but there was some evidence for no positive results on math. Overall the analysis showed mixed results, although in elementary school reading and middle school math, there was no underperformance by charter schools.

Next, the researchers turned their attention to observing levels of statistical significance at various levels of aggregation. They discovered that the way the studies were aggregated affected the outcomes. When Betts and Tang combined all studies, the result was that over one-third showed positive and significant charter school effects on
student performance. When they weighted the studies by the number of charter schools included in each study, the positive effects weakened considerably, probably due to the small number of charters included in some of the studies. Alternatively, when Betts and Tang weighted by the number of charter schools included in the study multiplied by the number of years for which they had data, the results approximated the first set of (unweighted) results.

Betts and Tang also tested for the magnitude of the effect in charter schools, based upon the studies included research. While the effects were generally positive, the magnitude of the effect was modest with an average median effect size of approximately 0.10. The only sizeable effects were found in elementary math at around 8% of a standard deviation. At the middle school level the magnitude of the effect was small for both math and reading at around 1% to 2% of a standard deviation. High school effect sizes were mixed, with all math ratings indicating a negative overall effect. When researchers observed the distribution of effect sizes they found that large magnitude effect sizes were primarily found in studies of relatively few charter schools; conversely, smaller effect sizes were found in studies of larger numbers of charter schools. The overall evidence was that charter schools more often outperform, than underperform, traditional public schools.

The meta-analysis conducted by Betts and Tang provided guidance to researchers on the subject of study design and also provided a basic overview of trends in charter school performance. It is limited by geographic factors; many of the studies included in the analysis are western states and eastern states, without much influence from states in
between. Further, the analysis included only 13 studies in nine states and the District of Columbia.

Cumulatively the studies indicating mixed performance provided expertise in the areas of research design and methodology, trends in charter school performance, the difficulty of isolating true value-added performance of charter schools versus selection bias characteristics which tend to skew results, and methods of interpreting findings. Gaps in this literature included the failure to consider time as a variable in charter school performance.

**Studies Finding Higher Performance Among Charter Schools.** Focusing on Indiana, Finch, Baker-Boudissa, & Cross (2007) analyzed the average difference in achievement over time between charters and traditional public schools, using a pre-post design with student level controls. Higher overall effects were found for charter school students than those enrolled in traditional public schools. What is most interesting about this study is that it contrasts sharply with the Miron, Coryn, and Mackety research, also released in 2007, that examines Indiana (among other states) on a five-year basis from 2001-2006. In the Miron et al. study, Indiana’s charter school achievement was lower than that of traditional public schools, although Indiana, along with Ohio, were identified as making the largest residual gains over time. In May, 2001, Indiana became the 37th state to pass charter school legislation. Since the Miron and colleagues study examined Indiana’s charter schools from the time of their inception as opposed to the Finch study which analyzed the same schools two years hence, it is possible that the advantages found
in the Finch study are the result of improvements in performance made among maturing charter schools.

Among the other panel studies showing positive results for charter schools, two are by Stanford researcher Caroline Hoxby and colleagues. Focusing on New York City in both reports, in the first study, Hoxby and Muraka (2007) examine individual student gains for random lotteried-in and lotteried-out students in comparison to traditional public school students from 2000-2006. Findings were that in both math and reading, elementary and middle school students showed higher gains than students in traditional public schools. In the 2009 report, Hoxby, Muraka, and Kang analyzed individual students achievement on 93% of New York City’s lotteried-in and lotteried-out charter school students in grades 3-12, from 2000-2008. According to Hoxby, Muraka, and Kang (2009), students who attend a charter school in New York City in kindergarten through eighth grade would close approximately 86% of the “Scarsdale-Harlem” achievement gap in math and 66% of the achievement gap in English Language Arts.

Two other panel studies came to opposite conclusions. Noblit and Dickson (2001) studied individual student scores in North Carolina’s charter schools for the North Carolina Board of Education over a period from 1997-2001, in both math and reading. A pre-post design was used for average gains with student controls. Results of the study indicated that for both math and reading, elementary and middle school students made comparable gains to their peers in traditional public schools. Conversely, a panel study by Bifulco and Ladd (2006) for the Smith Richardson Foundation looked at value-added rates for North Carolina’s third graders, only, during the period from 1996-2002. Their
findings indicated that in both math and reading, elementary students scored lower than traditional public school students. There could be a number of reasons for this discrepancy: both studies are panel studies and are, therefore, arguably more credible than either cohort or snapshot studies. The Noblit and Dickson study covers four years’ time; the Bifulco and Ladd research spans six years. It is possible that that charter school performance is decreasing in North Carolina’s charter schools over time. Another explanation might be that the differences in the two study designs accounted for the different outcomes. Additional research that duplicates the Bifulco and Ladd study design, time period, and variables would provide answers to this conundrum.

The final panel study included in this section of the literature review is that of Margaret Raymond, a researcher with the Center for Research on Educational Outcomes (CREDO, 2010). Raymond’s study was a matched comparison of individual charter school students to traditional public school “virtual” counterparts in grades 3-8, from 2003-2009, in both math and reading. Raymond’s 2010 results mirror Hoxby’s 2007 findings for New York City’s charter schools. The average charter school student scored higher in both reading and math than the average traditional public school student. Raymond’s school by school comparisons indicated that charter schools were stronger in math than reading. This study was an important confirmation of earlier work, particularly since Raymond and Hoxby sometimes hold opposing points of view, as is indicated elsewhere in this review.

Among the cohort studies finding positive results for charter schools, the 2008 report by Comey, Tatian, Guernsey, and Chang for the Urban Institute illustrates another
example where researchers focusing on the same demographic area found completely different results. Their team used a pre-post design with controls for proficiency and school-level factors to examine mathematics and reading achievement among students in Washington, D.C. The researchers found that gains in both mathematics and reading were equivalent for charter school and traditional public school students. This report is contrasted by the 2001 report by Henig, Holyoke, Lacireno-Paquet, and Moser from George Washington University which reported lower student gains for students enrolled in charter schools than their peers in traditional public schools. Charter school legislation passed in Washington D.C. in 1996. By 2010, it had 100 charter schools which served 30,026 students (Comey et al., 2008). A possible explanation for the diversity in findings between these two studies can be found in the work of Bifulco and Ladd (2006), Loveless (2002), and the Texas Education Agency (2001, 2002), each of which found that emerging charter schools are not as effective in raising achievement as mature charter schools.

Two snapshot studies inform the literature review regarding positive outcomes for charter students. The first is a 2005 analysis of Colorado’s state examination scores, controlling for ethnicity. Researchers Brodsky, Medler, and Schoales (2006) found that charter school students perform as well, or better, than their peers in traditional public schools. An important feature of Colorado’s charter schools is that legislation authorizing them was passed in 1993, thus the movement was more than a decade old at the time of the study. Second, charter schools in Colorado reportedly serve lower percentages of minority students than charter schools across the nation. The other study in this group is
from the Georgia Department of Education. It analyzes state testing data for the 2006-2007 academic year. In Georgia, researchers found that in both math and reading charter high school students made greater gains than did their traditional school peers. As in Colorado, Georgia passed its charter school legislation in 1993; therefore, again, the schools were more than a decade old at the time the study was conducted. These results concur with other research indicating that charter schools improve over time.

**Dueling Researchers**

The phrase *dueling researchers* or *dueling research* has been used by several charter school commentators (Hill, Angel, & Christensen, 2006; Rosenberg, 2004; Sparks, 2010) to describe the contentious debates ascribed to proponents and opponents of charter schools when they publicly clash on the still controversial issue. Such is the case concerning the 2003 National Assessment of Education Progress (NAEP) results. Frustrated at what they saw as stalling tactics on the part of the federal government with regard to sharing charter school achievement results contained within the 2003 NAEP, the American Federation of Teachers (AFT) hired their own researchers to conduct an analysis. Nelson, Rosenberg, and Van Meter (2004), found that scores for fourth and eighth graders on the 2003 NAEP were lower for charter school students regardless of socioeconomic status (SES), race/ethnicity, locale of the charter school, or governance. Hoxby (2004) contended that their research design was flawed and reported results from her own study indicating that charter elementary school students made higher gains in both mathematics and reading than traditional elementary school students. Roy and Mishel (2005), with the Economic Policy Institute (EPI) subsequently reanalyzed
Hoxby’s 2004 findings and reported that there were no differences in growth between charter and traditional public school students.

Dueling researchers can muddy the waters of understanding even more than sifting through what can seem like endlessly conflicting findings. When the U.S. Department of Education (USDOE) finally did release their results, they found that in mathematics charter school students scored lower and in reading charter school students made equivalent gains to traditional public school students. Interestingly, Braun, Jenkins, Grigg, and Tirre (2006) reanalyzed 2003 NAEP scores for fourth graders using hierarchical linear modeling. It compared 6,764 public schools to 150 charter schools across the nation. Results of the study indicated an agreement with the AFT. Even after controlling for student characteristics, charter school students still scored lower than traditional public school students by 5.2 points in reading and 5.8 points in mathematics.

More recently researchers Raymond and Hoxby went toe to toe over Raymond’s 2009 study results concerning charter school achievement in sixteen states. Raymond found that the achievement of charter school students was significantly lower than the performance of public school students by .03 standard deviations in reading and .01 standard deviations in math. Raymond reported that the lower results held for black and Hispanic students as well, however poor students attending charter schools performed at a higher rate than their traditional school peers. In her own report, Hoxby responded that Raymond’s research design and analysis were flawed, which Raymond subsequently denied in her written public response to Hoxby. To date, no resolution of the dispute has arisen.
Corroborating Research. Occasionally, researchers corroborate one another’s findings as has been noted within this literature review. More often than not, however, researchers corroborate their own findings through subsequent research on the same topic. Examples of this phenomenon are found throughout the 63 studies included in the review. One such panel study initially examined charter schools in Texas. Gronberg and Jansen (2001) used two types of designs in their research. First a pre-post with controls for proficiency and student-level variables; next they used a fixed-effects design with multivariate controls for student and school. Findings in both studies revealed that charter school students in Texas scored lower than students attending traditional public schools. In 2005, Gronberg and Jansen assessed charter schools using the same multivariate study with student and school controls. Their findings were somewhat different. Gronberg and Jansen found that in middle school, students in charter schools were making equivalent gains but in high schools the gains of charter school students were still lower than those made by traditional public school students. The most likely reason for the difference in the two studies was the maturity level of charter schools in Texas. (Bifulco & Ladd, 2006; Loveless, 2002; Texas Education Agency, 2001, 2002). The state passed its charter school legislation in 1995.

Several of the Miron studies corroborate one another. One of the strengths of his work has been that Miron often conducts subsequent studies on earlier subjects. In 2004, for example, Miron released a study using a multivariate analysis to compare charter versus traditional public school tests scores using matched cohorts in mathematics and reading from 1999-2004 in Delaware. Miron found that in mathematics, at both the
elementary and middle school levels, charter school students in Delaware scored about the same as traditional public school students. At the high school level, in mathematics, charter school gains were greater than among traditional public school students. In reading, however, he found charter elementary school students made lower gains, while charter middle and high school students made equivalent gains to their traditional peers.

By 2006 and with another year of data, Miron and colleagues released their second report on Delaware’s charter school performance from 1999-2005, using the same study design and the results were slightly different. This time findings suggested that in mathematics charter elementary gains were now greater than those of traditional public schools, while at the charter middle school level gains had dropped below that of traditional public schools. In charter high schools, mathematics gains were now greater. In reading, elementary charter gains remained lower than that of traditional public schools but middle and high school gains were now greater than their traditional public school peers.

In 2007, Miron and colleagues revisited Delaware’s charter school performance. This time a pre-post panel design was used to calculate the average difference in math and reading achievement over time between charter school students and those in traditional public schools, using both student and school-level controls. Overall findings for the study were that in elementary schools, charter schools generally performed at a lower level than their traditional public school counterparts. At both the charter middle and high school levels, however, students posted higher gains. These three studies
provide important information for charter school operators as they work to increase performance at the elementary level.

**Time as a Variable in Charter School Performance**

The second research question guiding the current study was whether charter schools perform better over time. Of the 63 research studies included in the literature review, only 10 studies specifically noted in their findings that charter school performance increased as the schools matured (Barr, 2007; Loveless, 2003; Miron, Coryn, & Mackety, 2007; Miron & Nelson, 2000; Miron, Nelson, & Risley, 2002; Public Impact, 2009; Raymond, 2009; Sass, 2006; Zimmer, Blank, Gill, & Christman, 2008; Zimmer, Gill, Booker, Lavertu, Sass, & White, 2009). Three studies stand out as particularly noteworthy: one each of the panel, cohort, and snapshot studies.

Sass (2006) researched charter schools in Florida over a three-year period of time, controlling for student-level effects in order to compare individual student growth at charters versus traditional public schools. His findings were that although charter schools initially produced lower gains in reading and math, they achieved similar ratings within five years in math and produced higher reading achievement levels than do traditional public schools. Sass also found that schools which targeted special education students achieved at lower rates than other charter schools, which is reasonable to expect. Sass found no differences in achievement rates between charters run by for-profit or not for-profit companies. Further, Sass pointed out the competition from nearby charter schools is associated with slight increases in math scores and no change in reading scores at nearby traditional public schools.
Miron, Coryn, and Mackety (2007) studied cohorts of charter school students in the Great Lakes States (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin) in a five-year longitudinal analysis of grades 3-11 based on each state’s proficiency exams from 2001-2002 to 2005-2006. In general, the findings were that charter schools in the Great Lakes States performed at a lower level than traditional public schools, particularly in Ohio and Indiana which had newer charter school initiatives than the other states included in the study. One highlight of the study was that both Indiana and Ohio were making the largest residual gains over time.

Finally, the 2010 *Urban School Performance Report: 2009-2010*, didn’t hold many positive findings in general. It found that neither charter nor traditional public schools were doing a good job educating students but that among poorly performing schools, charter schools were improving more than traditional public schools (Public Impact, 2010).

**Charter Schools in Ohio**

Ohio is well-positioned for studies of charter school performance in the Midwest. According to CNN’s Richard Quest, “Ohio is a microcosm of the entire United States” (p. 1). The state is roughly divided into five regions of vastly different economic, demographic, political, and social variation that is inherent in the whole of the U.S. In Ohio, one is never far from either a factory or a cornfield. Teacher unions in the state hold considerable power, although educational choice is making inroads throughout urban parts of the state. Today, parents have more educational choices than ever, including traditional public schools, voucher programs, charter schools, and private
schools. This section of the literature review examines achievement in Ohio and discusses the progression of the charter school movement throughout the state.

The performance of students enrolled in Ohio’s charter schools is not clear. Established in June, 1997, charter schools in Ohio were called *community schools* to avoid confusion since private schools in Ohio are also given a “charter.” Subsequent revisions to the original law created boundaries as to where charter schools could locate in the state (primarily urban areas) and who could authorize them (public institutions and non-profit organizations). In 2005, legislation took effect that ended Ohio Department of Education (ODE) oversight of charter schools. Instead, charter schools contract with a sponsor previously approved by ODE as an authorizer in the state. The role of the ODE Office of Community Schools (OCS) is essentially to monitor authorizers and provide technical assistance to authorizers and schools. In 1997, Ohio law permitted just two charter school authorizers; today that number has increased to 77 active sponsors in Ohio (Ohio Department of Education, 2009).

There are two types of charter schools in Ohio: Conversion schools are those that were formerly part of a traditional public school district and have “converted” into an independent charter school. Start-up charters are those that are new schools. At the present time, start-up charters can only locate within the “Big 8” urban districts: Akron, Canton, Cincinnati, Cleveland, Columbus, Dayton, Toledo, and Youngstown, in a pilot area in Lucas County, and in districts that are designated on the state’s local report card as being in “Academic Watch” or “Academic Emergency.” In 2008-2009, 84% of Ohio’s charter schools were “start-up” schools and 16% were “conversion” schools. Nine
percent of Ohio’s charter schools are virtual schools and nearly 5% (67 of 332 schools) of Ohio’s charters are high school drop-out prevention programs (Ohio Department of Education, 2009).

In 2009, House Bill 1 enacted provisions triggering public charter school closure for lack of satisfactory academic performance. Under this provision, start-up or conversion charter schools that remain in “Academic Emergency” for three years are closed by the state. As of early 2011, 13 charter schools have been closed. Schools in traditional public districts are not affected by House Bill 1.

Over the years, Ohio has enacted various caps on the growth of charter schools in the state. The only cap currently in operation concerns virtual charter schools. Since 2005, the state has had a moratorium on Internet-based schools until such time as the general assembly enacts standards for such schools. Ohio is now the 6th largest charter school state in the nation with 100,282 students attending 322 charter schools in the state. The average number of years a charter school in Ohio has been operational is 6.2. Of the 322 charter schools in the state, 16% have been open for 1-3 years; 43.5% have been open for 4-6 years; 26.7% for 7-9 years; and, 13.7% for 10 years or more. The fact that Ohio’s charter schools are, by and large, established institutions helped facilitate the current study’s focus on a possible link between longevity and academic achievement. During the 2008-2009 academic year alone, charter school enrollment increased by nearly 8% (Ohio Department of Education, 2009).

The charter school arena in Ohio is compelling for several reasons. First, the political nature of the state is such that continual challenges to charter school laws in the
state have made it a political hotbed in which to exist. Strongly organized labor unions have voiced significant concerns about the schools, most notably in the landmark case in 2006 when the Ohio Supreme Court ruled against the Ohio Federation of Teachers (OHFT), the Ohio School Board Association (OSBA), and the Ohio Congress of Parents and Teachers which had challenged the constitutionality of charter schools (Center for Education Reform, 2007).

Second, charter schools are dissimilar demographically to non-charter schools in the state. The racial composition of charter schools in Ohio is 42.7% white, 48.2% black, and 3.0% Hispanic. Non-charter schools have a racial composition of 77.4% white, 14.6% black, and 2.7% Hispanic. These statistics suggest that many black children in the state attend a charter school. Another interesting comparison is found in the eligibility for free or reduced lunch program. 65.2% of charter school students are eligible for the free and reduced lunch program; 34.8% are not eligible. In non-chartered schools, the reverse is true: 33.1% of students are eligible for free and reduced lunch; 66.9% are not. This inverse relationship strengthens the argument that Ohio’s charter schools enroll primarily poor, black students (Center for Education Reform, 2009).

Further, most of the students enrolled in charter schools live in urban areas, 71.7%, as contrasted to only 17.7% city dwellers in non-charter schools (Center for Education Reform). Finally, performance data on the 2009-2010 NAEP, indicated that only 10.2% of charter school fourth graders were proficient in math, compared to 47.0% in non-charter schools; 12.0% of charter school eighth graders were proficient in math, compared to 37.0% in non-charter schools (Center for Education Reform). Is this a
reflection of the poor performance of charter schools or is it indicative of the white-black achievement gap and the poverty gap in Ohio? Nine empirical studies examine performance in Ohio’s charter schools; their findings more fully inform our understanding of charter school student achievement.

**Panel Studies.** Of the nine Ohio studies that exist, only one is a panel study. In 2009, Zimmer, Gill, Booker, Lavertu, Sass, and White released “*Charter Schools in Eight States: Effects on Achievement, Attainment, Integration, and Competition.*” One of the states included in the study was Ohio. Longitudinal student level data was collected on students attending Ohio’s charter schools from 2004-2005 through 2007-2008. The study used a fixed-effects, multivariate design with student and school controls for mathematics and reading. Achievement findings were as follows: (1) students transferring to charter schools were “much lower achieving than their former peers” (p. xii); (2) Non-primary school charter school performance is indistinguishable from traditional public school performance; (3) Due to the influence of Ohio’s virtual charter schools, many of which begin in kindergarten, when the kindergarten-entry charter schools are included in the analysis, Ohio’s achievement performance in charter schools is “significantly and substantially negative” (p. xiv); and, (4) achievement performance improved in Ohio as charter schools matured.

This study is important for several reasons. First, it confirms what many charter school operators have long believed: that students enrolling in charter schools tend to be more disadvantaged and lower performing than their peers in the traditional public school they left behind. This fact alone helps to explain the lower than expected achievement
scores prevalent in Ohio. Second, if student achievement in middle and high schools is “indistinguishable” between charters and traditional public schools, then charter schools are having a positive impact on even those lowest achieving students that enter their schools. Third, it provides evidence that Ohio’s virtual schools would benefit by a review of practices and policies that engender such negative findings; and, fourth, the study evidences the performance improvement in more mature schools.

**Cohort Studies.** Among the two Ohio cohort studies, achievement findings for charter school students are mixed (Carr & Staley, 2005; Miron, Coryn, & Mackety, 2007). While both studies used the annual Ohio state examination as their outcomes measure, the results were dissimilar.

Using a value-added data research type within a model that used student controls as explanatory variables for the confounding influences of race and poverty when examining math, reading, writing, science, and social studies for fourth and sixth graders in eight urban districts, Carr and Staley (2005) found that charter school students outperformed their traditional public school peers in fourth grade reading, writing, and math and sixth grade writing. Further, charter school students performed just as well as traditional public school students in the other categories.

A limitation of this study is that it compared groups of charter school students to peers at the school they left, rather than examining individual student scores. On the other hand, the Carr and Staley study was one of the first to produce positive findings of student achievement in Ohio’s charter schools. The fact that a value-added measure was
used indicates that at least two year’s worth of data points were examined for the cohorts, adding credibility to the study.

The objective of the Miron, Coryn, and Mackety study of the Great Lakes States (2007) was to examine student achievement in charter schools versus traditional schools in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. For the purposes of this literature review, only Appendix F-Ohio of the report is considered. Researchers built data sets for the five school years beginning 2001-2002, forward, for each of the charter schools in Ohio. Unfortunately, at that time, Ohio did not begin collecting performance data on charter schools until after their first three years of operation. Since Ohio’s charter school law was not passed until 1997 many charter schools in Ohio, particularly charter high schools, did not have performance data through 2002. Therefore, many charter schools in Ohio were excluded from the study. In addition, for tenth grade, only two years of performance data was available: 2003-04 and 2004-05.

The study used regression analysis with the percentage of students passing the state examination as the dependent variable and minority, low income, special education, and urbanicity to create a residual gain score. The residual indicated the difference between the actual score and the predicted score. Negative residual scores indicated worse than expected performance; positive residual scores indicated better than expected performance. Overall, findings were that between 25-60% of the students in Ohio’s charter schools were meeting state standards. These percentages were lower than the state average and were lower than demographically similar schools as well. It is important to note, however, that “cohorts of the same charter schools are increasing by an average of
3.56 points per year” (p. 7), indicating that charter school performance is improving over time. Researchers reported that of the Great Lakes States examined, only Indiana (which has the newest charter school law, next to Ohio) had lower scores than Ohio.

**Snapshot Studies.** The six snapshot studies that follow also offer mixed results for charter school performance. Proficiency exam scores for fourth and sixth graders during the 2001-2002 academic year were the subject of a study by the Legislative Office of Education Oversight (LOEO) titled, “Community Schools in Ohio: Final Report on Student Performance, Parent Satisfaction, and Accountability.” The LOEO compared the performance of charter school students to their matched counterpart in traditional public schools. The findings were that neither charter schools nor traditional public schools performed well on the state exams. The report concluded that the most that could be said was that both entities performed “similarly low” in 2001-2002.

A limitation of the study was that it only looked at performance at one point in time, rather than being longitudinal in nature which might have predicted trends in charter school performance. Also, while probably well-intentioned, the timing of the study was premature, given that the first charter school did not open until 1998. Further, according to Miron (2007) ample data was not widely available for Ohio’s charter schools until 2003.

Jenkins (2005) focused on comparing charter school performance to that of its nearest local public school district and to matched public school districts throughout the state. The subjects were fourth and sixth graders whose performance on the 2002-2003 Ohio Achievement Test were examined in the areas of writing, reading, math, social
studies, and science. Jenkins’ study was a causal-comparative design using an analysis of variance to consider achievement results. Jenkins found that in each grade level and for every subject, charter school students scored significantly worse than traditional public school students. The author’s conclusion was that continuation of charter schools in Ohio should be reevaluated by the state.

Limitations of this study include the fact that it only examined one year of data instead of considering student scores over time. Further, the author admitted that the scoring rubric for each of the subjects tested varied which probably impacted results. Since charter schools enroll larger numbers of minority students as well as students in poverty than do traditional public schools (Center for Education Reform, 2008), one would expect scores to be lower unless appropriate controls were applied in the analysis. Finally, since charter school legislation was not passed in Ohio until June, 1997, the newness of the movement and the number of start-up schools in 2002-2003 would also be a factor in charter school performance.

Comparing the LOEO and Jenkins studies which analyzed data only one year apart, it is interesting that in 2001-2002 both traditional public and charter schools scored poorly, yet according to Jenkins, just one year later traditional public schools were far outpacing public charter schools. Reasons for these vastly different outcomes could be the result of design flaws or differences in study design, misleading information, bias, or simple error.

performance in reading and mathematics among elementary and middle school students and concluded that the results were mixed with charter school students scoring equally well in a number of categories. There was no category in which charter school students outperformed their counterparts in traditional public schools. This report is in agreement with the LOEO report examining data from 2001-2002 and is similarly limited in that the study looks at a single period of time in analyzing performance results.

In 2008, the Ohio Alliance for Public Charter Schools (OAPCS) also looked at urban schools but in this study a value-added analysis was conducted based on two years of Ohio Achievement Test (OAT) scores in fourth through eighth grades. Researchers found that 25% of Ohio’s 115 public charter schools within the “Big 8” urban boundaries (Akron, Canton, Cincinnati, Cleveland, Columbus, Dayton, Toledo, and Youngstown) produced more than one year of growth in one year’s time. Comparatively, only 22% of Ohio’s 397 traditional public school districts performed as high. Further, OAPCS reported that 54% of charter schools within the “Big 8” made at least one year of growth in one year’s time versus only 46% of traditional public schools within the “Big 8.”

The Ohio Education Association (OHEA), 2008, criticized the study claiming that OAPCS’s methodology was flawed thereby rendering its outcomes unfounded. According to OHEA, OAPCS did not use baseline data in its analysis. With no control for prior-year test scores, OHEA claimed that an accurate rendering of growth was impossible. Further, since OAPCS did not control for race, poverty and a number of other variables, OHEA’s position was that the report inaccurately reflected actual academic gains. At the time of OHEA’s response, the value-added data measurement was relatively
new in Ohio. OAPCS calculated the growth between two years of data. The first year’s data was the baseline test scores from the 2005-2006 academic year. Further, OAPCS was calculating the teacher’s performance in measuring growth, not the student, so controls for student ethnicity, poverty, and similar variables were not relevant to the objective of the study.

The Thomas Fordham Institute sponsored a study by Public Impact, comparing Ohio’s “Big 8” charter schools with traditional district performance on the state’s annual examination for 2008-2009. It used the state’s performance index and value-added growth measures to determine trends in achievement. As compared to the prior year in which a third of charter schools and traditional public schools had low performance and below expected growth, in 2008-2009 the percentage was reduced to 15 and 12, respectively. Researchers also discovered that in the schools with low performance and below expected rates of growth, charter schools improved more than district schools by a margin of 18 to 11 percent. On the state’s annual local report card, only 16% of Ohio’s “Big 8” charter schools received an excellent or effective rating as compared to 19% of schools in traditional districts. The authors concluded that both charter schools and traditional districts need to do a better job educating students. In reading, only 58% of district and charter schools are proficient; in math 52% of students in district schools were proficient versus 49% of students enrolled in Ohio’s charter schools.

A limitation to the research is that it compares performance at one point in time. In addition, findings indicate that charter schools are dissimilar to traditional public schools in that they have greater number of minorities and poor students than do
traditional public schools, even in the same locale (Center for Education Reform, 2008). No controls were used to mitigate the effects of these variables on student achievement.

The importance of the study with regard to charter school performance in Ohio include findings indicating that charter schools are making positive strides in both performance and growth measures.

In 2010, The Ohio Alliance for Public Charter Schools (OAPCS) updated its value-added analysis for the 141 charter schools within the “Big 8.” Analyzing growth over time in grades 4-8 in schools reporting value-added test data for the 2009-2010 state examinations, OAPCS found as follows: 75% of the charter schools within “Big 8” boundaries met or exceeded the state requirement of one year’s growth in one year’s time versus 63% of traditional public schools in the “Big 8.” Since the Zimmer et al. 2009 study, above, found that students transferring into Ohio’s charter schools had much lower achievement than the peers they left behind, it makes sense that once established in a charter school (value-added compares test scores from two years) those same students would have higher gains due to the larger initial achievement gap as compared to those with originally higher scores (Ohio Alliance for Public Charter Schools, 2010).

The same limitation exists in this study as in all snapshot studies of looking at students at a particular point in time instead of longitudinally. The value of this study is its value-added finding showing that charter schools in urban areas outperform their traditional public district counterparts in Ohio.
Summary of Research on Charter School Performance

This dissertation examines charter school performance in Ohio. The primary purpose of the study was to determine whether achievement levels are higher in charter schools relative to traditional public school performance and to consider the relationship between charter school performance and maturity levels of the initiative in Ohio. The literature review was organized to present (1) a conceptualization of the difficulties inherent in accurately assessing charter school performance; (2) an archetypal case depicting Ohio’s charter school initiative and attempts thus far to accurately measure performance; and, (3) a research design option that may provide results that are more accurate than previous studies to date. The literature reviewed in this chapter examines general research concerning charter school performance, Ohio’s charter school performance to date, and the effect of time in modifying achievement results.

The general literature about student achievement in charter schools represents a volume of studies that is limited in terms of research design and adequate controls to account for variables inherent in charter school enrollment. In general, many of the research studies are driven by which side of the charter school fence one is on. Much of the research is incomplete, disparate, and competes with similar studies possessing diverse findings.

Ohio’s charter school initiative was designed to provide educational choice within the state and to provide educational equity for all students. Research to date indicates that educational choice is a viable outcome of the charter school movement in the state—but only for those who live in urban areas. Little progress, if any, has been made with regard
to educational equity in the state. Unequal funding formulas between traditional public
schools and charter schools means that students who attend charters must make do with
less. Research on charter school performance does not provide a clear understanding of
its equity relative to traditional public schools.

Time is a variable that many believe influences performance in charter schools. A
limited number of research studies have found that achievement is higher in schools that
are more mature. Although the research is promising, a handful of studies do not provide
conclusive evidence on the subject. Greater numbers of robust studies, in terms of
research design and control variables are needed to understand the impact of new,
emerging, and maturing charter schools on academic performance.

The focus of this dissertation was to investigate achievement in charter schools
using a research design and data set that address some of the limitations of earlier studies
in the extant literature. Findings of the study might be used by policy makers as well as
charter school authorizers and operators to make decisions about charter schools that
enhance educational opportunities and help to ensure that stakeholders are more fully
informed about the role charter schools play in the educational arena.
Chapter 3: Research Design and Methodology

This chapter is divided into three sections. The first section provides an overview of the study. The second section describes the research design. Research methodology is reviewed in the third section. A brief summary concludes the chapter.

Overview

The study was inspired by a 2002 analysis of charter schools in Pennsylvania by Miron, Nelson, and Risley. It employed multiple regression to create filtered scores for use in comparing fifth grade math and reading performance in Ohio charter and public schools over a six-year period from 2005-2011. Two research questions guide the proposed study:

How does student achievement in Ohio’s public charters compare to that of traditional public schools in the state? and

Do Ohio’s charter schools show increased student achievement over time?

These questions were addressed via comparisons using filtered scores as a way of accounting for demographic differences between charter schools and traditional public schools. First developed by Nelson & Applegate (2002) as a method for assessing achievement scores in charter schools, a similar method was employed by Miron, Nelson, & Risely (2002) to measure the performance of Pennsylvania’s charter schools. The method uses mean scale scores on state assessment data to analyze changes over time. In the case of Pennsylvania’s charter schools, an examination of raw test scores showed charters performing worse than traditional schools because charters were attracting lower achieving students. Gains from year to year however, indicated a modestly positive
outcome for charters that was greater than for traditional public schools. According to Miron and colleagues (2002), this approach provides a better indicator of school effectiveness than do achievement scores because gains are much less correlated with student background factors, such as ethnicity, socioeconomic factors, and special education status, than raw scores.

The Pennsylvania study conducted by Miron and colleagues (2002) informed the current investigation on charter school effectiveness over time as compared to non-charter public schools. Specifically, the filtering design proposed in this study will parallel the strategy used in the analysis of Pennsylvania’s charter schools. Unlike the earlier Pennsylvania study, however, the current investigation compared filtered scores for Ohio’s charter schools with actual scores for the state’s traditional public schools (using a methodology will be explained in greater detail later in the chapter). This particular design and methodology offers three advantages: first, like the former study, the researcher needs to distinguish between student demographic influences on achievement and what can actually be attributable to school effectiveness. Second, the Pennsylvania model focused primarily on urban charter schools. In Ohio, except for minor exceptions, charter schools are legislatively mandated to be located within Ohio’s “Big 8”: Akron, Canton, Cincinnati, Cleveland, Columbus, Dayton, Toledo, and Youngstown. According to the Ohio Department of Education website, traditional school districts located within these cities perform among the lowest in the state. Given this fact, it seems reasonable that Ohio charter schools, like those in Pennsylvania, probably attract lower achieving students. Further, according to a 2007-2008 study by Public Impact,
students in urban charter schools scored lower than those enrolled in traditional districts in the same cities, but were more likely than traditional school students to attain beyond expected growth status. The final reason for using the selected design and methodology in the current study is perhaps its most compelling one: In July 2009, House Bill 1 (H.B. 1) mandated automatic closure for charters meeting the following criteria:

- Schools that do not offer a grade higher than 3 require closure if the school has been in the state’s designation of academic emergency for three of the four most recent school years.
- Schools that offer any of grades 4-8 but no grade higher than 9 require automatic closure if the school has been in the state’s designation of academic emergency for two of the three most recent school years and showed less than one year of academic growth in reading or math for at least two of the three most recent years.
- Schools that offer any of grades 10-12 are subject to automatic closure if the school has been in the state’s designation of academic emergency for three of the four most recent years. (p. 9, 10).

According to the Ohio Department of Education website, four categories make up the state designation: number of indicators met, performance index score, adequate yearly progress status, and value-added growth. Of the four categories, three of them are derived from raw scores, not from value-added gains. If charters are scoring lower than non-charters because they attract lower performing students than traditional public schools, it suggests important policy implications for legislators charged with determining criteria for automatic closure of Ohio’s charter schools (Ohio Department of Education, 2010).
The Miron et al. methodology described above compares favorably to other methods of measuring performance in charter schools for several reasons. First, although randomized experimental designs are considered to be the gold standard (Hoxby et al., 2009; Miron, 2005), in Ohio the number of charter schools with waiting lists resulting in lottered-in and lottered-out groups of students is limited to the point that the sample size would be too small for a robust study. Various other designs have been used to consider achievement including (1) comparisons of dissimilar students but with statistical controls for differences; (2) comparisons of similar groups without statistical controls; and (3) comparisons of dissimilar groups without statistical controls. Comparisons of groups of students over time, with and without statistical controls, are additional methods of analyzing charter school performance as are cross-sectional studies. None of these designs employ the more rigorous design described in the current study.

The most reasonable alternative is the quasi-experimental design I employed in which charter schools (experimental group) were compared to a unique group of demographically similar non-charter schools to obtain a filtered score which was subsequently compared to the host school (control group). This longitudinal study tracked students over time determine whether charter school performance improves with time relative to traditional public school performance.

**Research Design and Methodology**

Emulating Miron’s model, the study analyzed school effectiveness in terms of student achievement by developing filtered scores for fifth grade reading and math performance using the Ohio Achievement Test (OAT) data and subsequently comparing
charter school performance with that of traditional schools. The filtered scores for charter schools were developed by conducting regression analyses for traditional public schools, then using the slopes and intercepts derived from those regressions to compute predicted scores for charter schools (in conceptual terms, charter school performance when adjusted for student demographic characteristics identified in the literature as salient predictors of achievement). Predictors of achievement were operationalized as the following independent variables: 1) Family income is the percentage of students in each school who are eligible for free or reduced-price meals; 2) Race is the percentage of Black, Asian, Hispanic, and White students enrolled in each school; 3) Special education status is the percentage of students in each school with an Individualized Education Plan (IEP) pursuant to the Individuals with Disabilities in Education Act (IDEA); and 4) Enrollment is the natural logarithm of total school enrollment (transformation to the natural log was necessary owing to non-normal distribution of values).

For each subject area (reading and mathematics) and each data year, filtered scores for charter schools were compared with actual scores for traditional public schools using independent samples t-tests. The results of the t-test analysis allowed for describing and quantifying the direction and extent of difference between charter schools and traditional schools while accounting for demographic differences between the two groups. Additionally, bivariate correlational analysis was performed for each year of the study to investigate the strength of the relationship (using Pearson’s r) between school type designation (charter versus non-charter) and performance. The Pearson’s r values derived from these analyses were interpreted as a measure of effect size.
Summary

Chapter three presents an overview of the particulars of the study, including student performance measures, scope of the study, information about datasets and variables employed in the study.
Chapter 4: Results

The purpose of this study was to compare traditional and public charter schools in Ohio in terms of whether they showed different levels of academic performance after controlling for a number of demographic variables. The study also examined whether performance changed over time. Dependent variables were annual state reading and mathematics examination scores obtained from the Ohio Department of Education. The focus was on fifth grade, from 2005-2011.

Results from the analyses are presented in this chapter in the following sequence: 1) descriptive analyses of the fifth grade data set, 2) regression analyses using data from the fifth grade data set, and 3) comparative data analyses to examine the effect of time on performance. A chapter summary reviews major findings.

Descriptive Analysis

Descriptive statistics were generated to characterize salient features of the schools in the data set. The researcher used the Statistical Package for the Social Sciences (SPSS, version 18) to perform statistical analyses. A brief discussion of the descriptive findings for all schools (i.e., both charter and non-charter) is presented below, along with graphic displays comparing the same descriptives for public charter versus traditional public schools over time (presented in Figures 1 and 2).

Dependent Variables

The study used twelve dependent variables from the annual Ohio Achievement Test (OAT) to operationalize fifth grade achievement levels among Ohio students: OAT 5 reading scale scores and OAT 5 mathematics scale scores (for each of the school years
from 2005-2006 through 2010-2011). Neither dependent variable displayed a normal distribution with deviations demonstrating both skewness and kurtosis.

With respect to fifth grade reading achievement, the frequency distribution tended to be negatively skewed for the first three years of the study and more moderately skewed thereafter. Kurtosis was found in each year of the fifth grade reading distribution; both leptokurtosis (a sharply peaked distribution) in 2006-2007, and slight platykurtosis (a flatter distribution) in all others years. This finding indicates that scores were more widely spread around the mean. The frequency distribution for fifth grade mathematics showed a trend toward moderate skewness for all years. In terms of kurtosis, the distribution was platykurtic, so scores were generally lower than what would be found in a normal distribution with a few scores distributed in the higher and lower ranges.

Field (2009) noted, however, that in sample sizes over 200, “significance tests of skew and kurtosis should not be used because they are likely to be significant even when skew and kurtosis are not too different from normal” (p. 139). He recommended that in large samples it is more important to look at the shape of the distribution as well as the values, rather than to calculate significance. Histograms confirmed that the distributions tended to approximate a normal distribution.

Descriptive statistics for the dependent variables are presented in Table 1.
Table 1

*Descriptive Statistics Summary: Reading and Mathematics Scores-Mean Percent Proficient*

<table>
<thead>
<tr>
<th>Subject/Year</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading 2005-06</td>
<td>1,648</td>
<td>73.86</td>
<td>18.073</td>
</tr>
<tr>
<td>Math 2005-06</td>
<td>1,648</td>
<td>61.26</td>
<td>22.252</td>
</tr>
<tr>
<td>Reading 2006-07</td>
<td>1,666</td>
<td>78.87</td>
<td>15.794</td>
</tr>
<tr>
<td>Math 2006-07</td>
<td>1,666</td>
<td>59.61</td>
<td>20.836</td>
</tr>
<tr>
<td>Reading 2007-08</td>
<td>1,648</td>
<td>73.86</td>
<td>18.073</td>
</tr>
<tr>
<td>Math 2007-08</td>
<td>1,648</td>
<td>61.26</td>
<td>22.252</td>
</tr>
<tr>
<td>Reading 2008-09</td>
<td>1,643</td>
<td>69.19</td>
<td>19.684</td>
</tr>
<tr>
<td>Math 2008-09</td>
<td>1,643</td>
<td>59.26</td>
<td>22.116</td>
</tr>
<tr>
<td>Reading 2009-10</td>
<td>1,656</td>
<td>68.99</td>
<td>18.960</td>
</tr>
<tr>
<td>Math 2009-10</td>
<td>1,656</td>
<td>63.87</td>
<td>21.989</td>
</tr>
<tr>
<td>Reading 2010-11</td>
<td>1,636</td>
<td>71.41</td>
<td>18.164</td>
</tr>
<tr>
<td>Math 2010-11</td>
<td>1,636</td>
<td>63.00</td>
<td>21.851</td>
</tr>
</tbody>
</table>

Figures 1 and 2 depict the mean value for OAT percent proficiency scores for fifth grade reading and mathematics from 2005 through 2011, without consideration of the independent variables generally found to affect student achievement (Bower & Hilgard, 1981; Gipps & Murphy, 1994; Jarvis, Holford, & Griffin, 1998; Lubienski, 2002; Tanner, 2001). Charter schools demonstrated lower test achievement in every grade, in both subjects, for all years of data used in the study. Overall it appears that neither type of
school is making remarkable progress, although charters appear to demonstrate more of an upward trend. Results in grades other than fifth were mixed; graphic depictions for grades 6-10 can be found in the Appendix.

Figure 1. Comparison of state examination scores (OAT, OGT) for traditional public schools and public charter schools for fifth grade reading from 2005-2011. The mean charter school reading score is lower for every year included in the study than the traditional public school score.
Figure 2. Comparison of state examination scores (OAT, OGT) for traditional public schools and public charter schools for fifth grade mathematics from 2005-2011. The mean charter school mathematics score is lower for every year included in the study than the traditional public school score, but trends upward over time.

**Independent Variables**

Three building-level independent variables represent aggregate measures of student demographic characteristics: the percentage of students eligible for free and reduced price meals (PSES), the percentage of students eligible for special education services (i.e., the percentage of students with an active individualized education program [IEP] [PSPED]), and the percentage of White students (PWHITE). None of the variables demonstrated a normal distribution. In nearly every year under consideration, the distribution for the percentage of students eligible for free and reduced lunch (PSES), percentage of students with IEPs (PSPED), and percent White students (PWHITE) were highly skewed, indicating a greater percent of poor, minority, and special education
students enrolled in charters versus traditional public schools. Leptokurtosis was prevalent in most independent variables. Only the percent of students eligible for free and reduced meals (PSES) presented platykurtosis. Again, adhering to Field’s (2009) directive, histograms were examined and were found to approximate normal distributions.

A summary of the means and standards deviations for the model’s independent variables appears in Tables 2 to 7. Two tables are utilized for each independent variable. The first table presents descriptives for all schools. The second table in each category of independent variables depicts statistics for schools disaggregated by school type.

Table 2

*Descriptive Statistics Summary: Percentage of Students Eligible for Free or Reduced Price Meals (PSES)-All Schools*

<table>
<thead>
<tr>
<th>Subject/Year</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-06</td>
<td>3,515</td>
<td>39.27</td>
<td>27.020</td>
</tr>
<tr>
<td>2006-07</td>
<td>3,487</td>
<td>40.36</td>
<td>26.833</td>
</tr>
<tr>
<td>2007-08</td>
<td>3,472</td>
<td>42.07</td>
<td>27.164</td>
</tr>
<tr>
<td>2008-09</td>
<td>3,463</td>
<td>44.58</td>
<td>27.147</td>
</tr>
<tr>
<td>2009-10</td>
<td>3,451</td>
<td>47.35</td>
<td>26.811</td>
</tr>
<tr>
<td>2010-11</td>
<td>3,429</td>
<td>48.73</td>
<td>26.380</td>
</tr>
</tbody>
</table>
Table 3

*Descriptive Statistics Summary: Percentage of Students Eligible for Free or Reduced Price Meals (PSES)-Disaggregated by School Type*

<table>
<thead>
<tr>
<th>Subject/Year</th>
<th>School Type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-06</td>
<td>T</td>
<td>38.20</td>
<td>26.632</td>
</tr>
<tr>
<td>2005-06</td>
<td>C</td>
<td>68.96</td>
<td>19.764</td>
</tr>
<tr>
<td>2006-07</td>
<td>T</td>
<td>39.07</td>
<td>26.326</td>
</tr>
<tr>
<td>2006-07</td>
<td>C</td>
<td>68.78</td>
<td>21.836</td>
</tr>
<tr>
<td>2007-08</td>
<td>T</td>
<td>40.59</td>
<td>26.587</td>
</tr>
<tr>
<td>2007-08</td>
<td>C</td>
<td>70.46</td>
<td>21.885</td>
</tr>
<tr>
<td>2008-09</td>
<td>T</td>
<td>43.17</td>
<td>26.659</td>
</tr>
<tr>
<td>2008-09</td>
<td>C</td>
<td>70.95</td>
<td>22.315</td>
</tr>
<tr>
<td>2009-10</td>
<td>T</td>
<td>45.62</td>
<td>26.152</td>
</tr>
<tr>
<td>2009-10</td>
<td>C</td>
<td>75.02</td>
<td>21.582</td>
</tr>
<tr>
<td>2010-11</td>
<td>T</td>
<td>46.97</td>
<td>25.708</td>
</tr>
<tr>
<td>2010-11</td>
<td>C</td>
<td>74.94</td>
<td>22.038</td>
</tr>
</tbody>
</table>

*Note.* “T” denotes traditional public schools; “C” denotes public charter schools.

Disaggregated by public charter school status, the following patterns are apparent for the free and reduced meals rate variable: 1) public charter schools tended to have a higher mean percentage of students eligible for free and reduced lunch, based on total school enrollment, and 2) fifth grade public charter school students had the lowest performance on state examinations in both reading and mathematics.
Table 4

Descriptive Statistics Summary: Percentage of Students Eligible for Special Education Services (PSPED)-All Schools

<table>
<thead>
<tr>
<th>Subject/Year</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-06</td>
<td>3,535</td>
<td>15.35</td>
<td>8.549</td>
</tr>
<tr>
<td>2006-07</td>
<td>3,513</td>
<td>15.16</td>
<td>8.394</td>
</tr>
<tr>
<td>2007-08</td>
<td>3,480</td>
<td>15.41</td>
<td>8.584</td>
</tr>
<tr>
<td>2008-09</td>
<td>3,447</td>
<td>15.90</td>
<td>8.479</td>
</tr>
<tr>
<td>2009-10</td>
<td>3,426</td>
<td>15.70</td>
<td>8.411</td>
</tr>
<tr>
<td>2010-11</td>
<td>3,390</td>
<td>15.46</td>
<td>7.906</td>
</tr>
</tbody>
</table>
Table 5

*Descriptive Statistics Summary: Percentage of Special Education Students (PSPED)-Disaggregated by School Type*

<table>
<thead>
<tr>
<th>Subject/Year</th>
<th>School Type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-06</td>
<td>T</td>
<td>15.25</td>
<td>8.081</td>
</tr>
<tr>
<td>2005-06</td>
<td>C</td>
<td>18.60</td>
<td>17.968</td>
</tr>
<tr>
<td>2006-07</td>
<td>T</td>
<td>15.04</td>
<td>7.807</td>
</tr>
<tr>
<td>2006-07</td>
<td>C</td>
<td>18.27</td>
<td>18.274</td>
</tr>
<tr>
<td>2007-08</td>
<td>T</td>
<td>15.27</td>
<td>7.973</td>
</tr>
<tr>
<td>2007-08</td>
<td>C</td>
<td>18.80</td>
<td>17.328</td>
</tr>
<tr>
<td>2008-09</td>
<td>T</td>
<td>15.87</td>
<td>7.999</td>
</tr>
<tr>
<td>2008-09</td>
<td>C</td>
<td>16.48</td>
<td>15.875</td>
</tr>
<tr>
<td>2009-10</td>
<td>T</td>
<td>15.60</td>
<td>7.811</td>
</tr>
<tr>
<td>2009-10</td>
<td>C</td>
<td>17.60</td>
<td>16.187</td>
</tr>
<tr>
<td>2010-11</td>
<td>T</td>
<td>15.37</td>
<td>7.236</td>
</tr>
<tr>
<td>2010-11</td>
<td>C</td>
<td>17.05</td>
<td>15.739</td>
</tr>
</tbody>
</table>

*Note.* “T” denotes traditional public schools; “C” denotes public charter schools.

Disaggregated by public charter school status, the special education data revealed the following patterns: 1) special needs students in public charter schools demonstrate a lower mean score on the OAT, 2) public charter schools enrolled a greater percentage of special needs students, and 3) public charter school special needs students performed
lower on both reading and mathematics examinations than their peers with IEPs in traditional public schools.

Table 6

*Descriptive Statistics Summary: Percentage of White Students (PWHITE)-All Schools*

<table>
<thead>
<tr>
<th>Subject/Year</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-06</td>
<td>3,470</td>
<td>80.36</td>
<td>25.485</td>
</tr>
<tr>
<td>2006-07</td>
<td>3,441</td>
<td>79.75</td>
<td>25.595</td>
</tr>
<tr>
<td>2007-08</td>
<td>3,395</td>
<td>79.18</td>
<td>25.779</td>
</tr>
<tr>
<td>2008-09</td>
<td>3,364</td>
<td>78.59</td>
<td>26.047</td>
</tr>
<tr>
<td>2009-10</td>
<td>3,347</td>
<td>78.06</td>
<td>26.246</td>
</tr>
<tr>
<td>2010-11</td>
<td>3,321</td>
<td>77.20</td>
<td>26.373</td>
</tr>
</tbody>
</table>
Table 7

Descriptive Statistics Summary: Percent of White Students (PWHITE)-Disaggregated by School Type

<table>
<thead>
<tr>
<th>Subject/Year</th>
<th>School Type</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-06</td>
<td>T</td>
<td>81.22</td>
<td>24.714</td>
</tr>
<tr>
<td>2005-06</td>
<td>C</td>
<td>49.60</td>
<td>32.174</td>
</tr>
<tr>
<td>2006-07</td>
<td>T</td>
<td>80.74</td>
<td>24.718</td>
</tr>
<tr>
<td>2006-07</td>
<td>C</td>
<td>46.46</td>
<td>31.643</td>
</tr>
<tr>
<td>2007-08</td>
<td>T</td>
<td>80.23</td>
<td>24.907</td>
</tr>
<tr>
<td>2007-08</td>
<td>C</td>
<td>48.32</td>
<td>31.380</td>
</tr>
<tr>
<td>2008-09</td>
<td>T</td>
<td>79.88</td>
<td>24.937</td>
</tr>
<tr>
<td>2008-09</td>
<td>C</td>
<td>44.55</td>
<td>31.211</td>
</tr>
<tr>
<td>2009-10</td>
<td>T</td>
<td>79.47</td>
<td>25.105</td>
</tr>
<tr>
<td>2009-10</td>
<td>C</td>
<td>47.19</td>
<td>31.362</td>
</tr>
<tr>
<td>2010-11</td>
<td>T</td>
<td>78.82</td>
<td>24.989</td>
</tr>
<tr>
<td>2010-11</td>
<td>C</td>
<td>44.82</td>
<td>32.008</td>
</tr>
</tbody>
</table>

*Note.* “T” denotes traditional public schools; “C” denotes public charter schools.

Observations derived from the disaggregated data on ethnicity indicated the following: 1) public charter schools evidenced a lower mean percentage of white students and a larger standard deviation than did traditional public schools, and, 2) fifth grade public charter school students scored lower than their traditional public school counterparts on both reading and mathematics.
A graphic display of each of the mean values for the independent variables in each data year is depicted in Figures 3-5. Results indicate that Ohio public charter schools enroll a higher percentage of economically disadvantaged students, a greater percentage of special education students, and fewer white students than attend traditional public schools. Over time, schools are enrolling higher percentages of poor, non-white, and special needs students.

\textit{Figure 3.} Comparison of trends in the enrollment of students with low socioeconomic status among traditional public and public charter schools from 2005-2011. Both types of schools are enrolling greater numbers of poor students over time, however public charter schools enroll a larger mean percentage of these students.
Figure 4. Comparison of trends in special education enrollment among traditional public and public charter schools from 2005-2011. Public charter schools enroll a larger mean percentage of special needs students than do traditional public schools.
Figure 5. Comparison of the percentage of white students enrolled in traditional public and public charter schools. Public charter schools enroll a lower mean percentage of white students than do traditional public schools and the percentage of enrolled white students continues to decline over time in public charter schools.

As part of preparing these descriptives, all variables were checked for outliers and the researcher ensured that all scores were in a meaningful range. The next section describes the results from the regression analysis.

Regression Analysis

As the first step in the process of creating filtered scores to account for differences in the demographic characteristics of public charter schools versus traditional public schools, the dependent variables were regressed on several independent variables generally reported in the research literature as being associated with achievement outcomes (Bower & Hilgard, 1981; Gipps & Murphy, 1994; Jarvis, Holford, & Griffin,
1998; Lubienski, 2002; Tanner, 2001). Drawing on the approach used by Miron (2002), filtered scores were then created by using the slope and intercept obtained from two regression models (one for reading and one for mathematics) performed with traditional public schools for each year of the study to predict scores for the charter schools for each subject area and year. Score differences were then analyzed over time to determine whether the gap between public charter and traditional public school achievement changed.

Specifically, the multiple regression equations were deployed twice to test two models to determine the influence of multiple independent variables generally found to affect performance, on student achievement outcomes for a single year. The dependent variables were reading and mathematics achievement on annual state examinations. Predictors included socioeconomic status (PSES), special needs status (PSPED), ethnicity (PWHITE), and enrollment (PENR). Prior to conducting the analyses, anomalous cases with a specialized focus were removed, including virtual schools and those exclusively serving a particular type of student including special needs, gifted, and dropouts. The total number of cases for each year of the six-year study varied from 1,423 to 1,455. Cases with missing information were eliminated from the study for that particular subject and year. The researcher used a forced entry method in which all predictors were entered into SPSS simultaneously. The standard criteria was used for statistical significance with $\alpha = .05$. Tables 8-19 report coefficients and adjusted $R$-squared values for each of the regressions.
Standard research assumptions were tested to assure that research conclusions were not affected by violations in the data. The types of tests conducted and their associated results are listed below:

1. Assumptions of normality: Skewness and kurtosis were examined for normality. As noted in the text, none of the distributions could be considered normal. Field (2009) stated that in cases greater than 200, the size and shape of the distribution is preferable to using skew and kurtosis. Examination of histograms approximated a normal distribution.

2. Assumption of homogeneity of variance: The Field model (p. 247-248) for comparing the plot of standardized residuals against standardized predicted values was used to check the model for fifth grade reading. Figure 6, below, depicts the scatterplot for fifth grade reading.
Figure 6. Although a linear relationship is evident, the assumption of homoscedasticity has been violated. Points that are spread out across the graph indicate increasing variance across the residuals, although the pattern of data points is getting narrower; i.e., variability is lower at 1 compared to -3.

3. Independence assumption: To ensure that the sample observations are independent of each other, the Durbin-Watson test was employed. Field (2009) stated that the Durbin-Watson value may vary from between 0 and 4, with 2 indicating no correlation between the residual terms. The Durbin-Watson value of 1.966 for reading, 2005-2006, indicates a positive correlation among adjacent residuals, meaning that the residuals are uncorrelated (independent of one another).

4. Multicollinearity: The Value Inflation Factor (VIF) was used to check the degree to which predictor variables have a perfect linear relationship. Reading 2005-
2006 VIF values for the independent variables were as follows: 1.070 (PENR0506), 2.102 (PSES0506), 1.868 (PWHITE0506), and 1.172 (PSPED0506). Since the VIF threshold is 10 and tolerance is .10, the values are within an acceptable range.

The process of checking assumptions following the procedures described above was conducted for each school, for each year of the study. The results confirmed the viability of the models and regression procedures identified to answer the research questions.

2005-2006 Reading

Table 8 presents the results for the regression analysis predicting fifth grade reading performance outcomes for the 2005-06 school year.

Table 8

Summary of Regression for Variables Predicting Reading Performance Outcomes
(n=1,447)

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR0506</td>
<td>-.002</td>
<td>.002</td>
<td>-.018</td>
</tr>
<tr>
<td>PSES0506</td>
<td>-.322</td>
<td>.015</td>
<td>-.556***</td>
</tr>
<tr>
<td>PWHITE0506</td>
<td>.137</td>
<td>.014</td>
<td>.231***</td>
</tr>
<tr>
<td>PSPED0506</td>
<td>-.100</td>
<td>.052</td>
<td>-.036***</td>
</tr>
</tbody>
</table>

Notes: Adjusted R- Square = .549; *p ≤ .050; **p ≤ .010; ***p ≤ .001
As displayed in Table 8, socioeconomic status, ethnicity, and special education status are significant predictors of fifth grade reading in 2005-2006. Both socioeconomic status and special education status represent a negative relationship on the reading outcome. Therefore, gains in enrollment that increase these percentages should result in lower achievement levels. Only ethnicity exhibited a positive relationship on the achievement outcome meaning that increases in white enrollment should result in higher achievement levels.

2005-2006 Mathematics

Table 9 presents the results for the regression analysis predicting fifth grade mathematics performance outcomes for the 2005-06 school year.

Table 9

Summary of Regression for Variables Predicting Mathematics Performance Outcomes (n=1,447)

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR0506</td>
<td>-.004</td>
<td>.002</td>
<td>-.036</td>
</tr>
<tr>
<td>PSES0506</td>
<td>-.443</td>
<td>.020</td>
<td>-.597***</td>
</tr>
<tr>
<td>PWHITE0506</td>
<td>.128</td>
<td>.019</td>
<td>.168***</td>
</tr>
<tr>
<td>PSPED0506</td>
<td>-.071</td>
<td>.069</td>
<td>-.020</td>
</tr>
</tbody>
</table>

Notes: Adjusted R-Square = .521; *p ≤ .050; **p ≤ .010; ***p ≤ .001

Results reported in Table 9 indicate that socioeconomic status and ethnicity are significant predictors of fifth grade mathematics achievement in 2005-2006.
Socioeconomic status has a negative relationship to mathematics achievement so increases in enrollment of greater numbers of students eligible for free and reduced price meals should decrease mathematics scores. The only independent variable with a positive relationship to mathematics gains is PWHITE0506.

**2006-2007 Reading**

Table 10 presents the results for the regression analysis predicting fifth grade reading performance outcomes for the 2006-07 school year.

Table 10

*Summary of Regression for Variables Predicting Reading Performance Outcomes (n=1,446)*

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>$B$</th>
<th>$SE B$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENR0607</td>
<td>-.003</td>
<td>.001</td>
<td>-.037*</td>
</tr>
<tr>
<td>PSES0607</td>
<td>-.274</td>
<td>.012</td>
<td>-.545***</td>
</tr>
<tr>
<td>PWHITE0607</td>
<td>.129</td>
<td>.012</td>
<td>.257***</td>
</tr>
<tr>
<td>PSPED0607</td>
<td>-.110</td>
<td>.044</td>
<td>-.047*</td>
</tr>
</tbody>
</table>

Notes: Adjusted $R^2$ = .562; *$p \leq .050$; **$p \leq .010$; ***$p \leq .001$

Table 10 indicates that all four variables are significant as predictors of reading outcomes for the 2006-2007 academic year. PENR0607 and PSPED0607 are significant, but not as significant a predictor as PSES0607 and PWHITE0607. Notice that
PWHITE0607 continues to be the only independent variable having a positive relationship with reading performance gains.

**2006-2007 Mathematics**

Table 11 presents the results for the regression analysis predicting fifth grade mathematics performance outcomes for the 2006-07 school year.

Table 11

*Summary of Regression for Variables Predicting Mathematics Performance Outcomes*

*(n=1,442)*

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR0607</td>
<td>-.003</td>
<td>.002</td>
<td>-.026</td>
</tr>
<tr>
<td>PSES0607</td>
<td>-.447</td>
<td>.018</td>
<td>-.642***</td>
</tr>
<tr>
<td>PWHITE0607</td>
<td>.090</td>
<td>.017</td>
<td>.130***</td>
</tr>
<tr>
<td>PSPED0607</td>
<td>.006</td>
<td>.064</td>
<td>.002</td>
</tr>
</tbody>
</table>

Notes: *Adjusted R- Square = .531; *p ≤ .050; **p ≤ .010; ***p ≤ .001*

The data in Table 11 demonstrate that only two independent variables in the model are significant, PSES0607 and PWHITE0607. PWHITE continues to be the only independent variable possessing a positive relationship with mathematics performance gain.
2007-2008 Reading

Table 12 presents the results for the regression analysis predicting fifth grade reading performance outcomes for the 2007-08 school year.

Table 12

<p>| Summary of Regression for Variables Predicting Reading Performance Outcomes (n=1,454) |</p>
<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR0708</td>
<td>-.003</td>
<td>.002</td>
<td>-.037*</td>
</tr>
<tr>
<td>PSES0708</td>
<td>-.275</td>
<td>.014</td>
<td>-.487***</td>
</tr>
<tr>
<td>PWHITE0708</td>
<td>.169</td>
<td>.014</td>
<td>.291***</td>
</tr>
<tr>
<td>PSPED0708</td>
<td>-.161</td>
<td>.051</td>
<td>-.062***</td>
</tr>
</tbody>
</table>

Notes: Adjusted R-Square = .529; *p ≤ .050; **p ≤ .010; ***p ≤ .001

All four independent variables in Table 12 are significant, with enrollment size demonstrated the weakest association among the four and showing a negative relationship to reading gains (i.e., smaller schools = higher reading performance). PWHITE is the only independent variable to have a positive relationship with reading score gains. Both socioeconomic status and special education status have a negative impact on reading scores meaning that if enrollment in these two categories increases, scores should decline.
2007-2008 Mathematics

Table 13 presents the results for the regression analysis predicting fifth grade mathematics performance outcomes for the 2007-08 school year.

Table 13

Summary of Regression for Variables Predicting Mathematics Performance Outcomes

(n=1,450)

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR0708</td>
<td>-.005</td>
<td>.002</td>
<td>-.048*</td>
</tr>
<tr>
<td>PSES0708</td>
<td>-.384</td>
<td>.019</td>
<td>-.532***</td>
</tr>
<tr>
<td>PWHITE0708</td>
<td>.163</td>
<td>.018</td>
<td>.220***</td>
</tr>
<tr>
<td>PSPED0708</td>
<td>-.141</td>
<td>.067</td>
<td>-.042*</td>
</tr>
</tbody>
</table>

Notes: Adjusted R- Square = .493; *p ≤ .050; **p ≤ .010; ***p ≤ .001

Table 13 shows that all four independent variables in the model are significant for predicting mathematics outcomes. Enrollment size and special education status exert less influence than socioeconomic status and ethnicity. Of the four independent variables selected, all but PWHITE0708 exert a negative influence on mathematics scores (i.e., higher rates of minority, economically disadvantaged, and special education students are associated with lower mathematics performance, while higher rates of White students are associated with increased mathematics performance).
2008-2009 Reading

Table 14 presents the results for the regression analysis predicting fifth grade reading performance outcomes for the 2008-09 school year.

Table 14

Summary of Regression for Variables Predicting Reading Performance Outcomes
(n=1,428)

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR0809</td>
<td>-.003</td>
<td>.002</td>
<td>-.029</td>
</tr>
<tr>
<td>PSES0809</td>
<td>-.338</td>
<td>.014</td>
<td>-.551***</td>
</tr>
<tr>
<td>PWHITE0809</td>
<td>.172</td>
<td>.013</td>
<td>.275***</td>
</tr>
<tr>
<td>PSPED0809</td>
<td>-.365</td>
<td>.048</td>
<td>-.129***</td>
</tr>
</tbody>
</table>

Notes: Adjusted R-Square = .657; *p ≤ .050; **p ≤ .010; ***p ≤ .001

Table 14 indicates that three of the four independent variables are significant in predicting reading scores. As in the previous tables, only PWHITE demonstrates a positive association with reading performance in 2008-2009.

2008-2009 Mathematics

Table 15 presents the results for the regression analysis predicting fifth grade mathematics performance outcomes for the 2008-09 school year.
Table 15

Summary of Regression for Variables Predicting Mathematics Performance Outcomes

\(n=1,433\)

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>B</th>
<th>SE B</th>
<th>(\beta)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR0809</td>
<td>-.002</td>
<td>.002</td>
<td>-.014</td>
</tr>
<tr>
<td>PSES0809</td>
<td>-.412</td>
<td>.017</td>
<td>-.584***</td>
</tr>
<tr>
<td>PWHITE0809</td>
<td>.155</td>
<td>.016</td>
<td>.216***</td>
</tr>
<tr>
<td>PSPED0809</td>
<td>-.327</td>
<td>.059</td>
<td>-.101***</td>
</tr>
</tbody>
</table>

Notes: Adjusted R-Square = .613; *p \leq .050; **p \leq .010; ***p \leq .001

Again, the percentage of white students in the school is the only independent variable demonstrating a positive relationship, as shown in Table 15. Enrollment size is not a significant predictor of mathematics performance in this model, and socioeconomic status and special education status show a negative association with proficiency rates.

2009-2010 Reading

Table 16 presents the results for the regression analysis predicting fifth grade reading performance outcomes for the 2009-10 school year.
Table 16

Summary of Regression for Variables Predicting Reading Performance Outcomes (n=1,432)

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>$B$</th>
<th>$SE_{B}$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR0910</td>
<td>-.002</td>
<td>.001</td>
<td>-.020</td>
</tr>
<tr>
<td>PSES0910</td>
<td>-.324</td>
<td>.014</td>
<td>-.536***</td>
</tr>
<tr>
<td>PWHITE0910</td>
<td>.182</td>
<td>.012</td>
<td>.304***</td>
</tr>
<tr>
<td>PSPED0910</td>
<td>-.351</td>
<td>.053</td>
<td>-.114***</td>
</tr>
</tbody>
</table>

Notes: Adjusted $R$ -Square = .659; *$p \leq .050$; **$p \leq .010$; ***$p \leq .001$

Again, PWHITE is the only independent variable demonstrating a significant positive association with reading performance. Enrollment size is not a significant predictor of reading performance gains in 2009-2010. Both PSES0910 and PSPED0910 are negatively associated with reading performance.

**2009-2010 Mathematics**

Table 17 presents the results for the regression analysis predicting fifth grade mathematics performance outcomes for the 2009-10 school year.
Table 17

Summary of Regression for Variables Predicting Mathematics Performance Outcomes (n=1,436)

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>$B$</th>
<th>$SE_B$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR0910</td>
<td>.001</td>
<td>.002</td>
<td>.008</td>
</tr>
<tr>
<td>PSES0910</td>
<td>-.374</td>
<td>.017</td>
<td>-.524***</td>
</tr>
<tr>
<td>PWHITE0910</td>
<td>.203</td>
<td>.015</td>
<td>.288***</td>
</tr>
<tr>
<td>PSPED0910</td>
<td>-.373</td>
<td>.066</td>
<td>-.103***</td>
</tr>
</tbody>
</table>

Notes: Adjusted $R^2$ = .618; *$p \leq .050$; **$p \leq .010$; ***$p \leq .001$

Table 17 indicates that enrollment size was not a significant predictor of mathematics performance in the 2009-2010 academic year. Three of the independent variables are significant, with socioeconomic status and special education status demonstrating a negative association with performance scores. PWHITE, again, is the only independent variable to show a positive association with mathematics performance in 2009-2010.

2010-2011 Reading

Table 18 presents the results for the regression analysis predicting fifth grade reading performance outcomes for the 2010-11 school year.
Table 18

Summary of Regression for Variables Predicting Reading Performance Outcomes (n=1,422)

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR1011</td>
<td>-.022</td>
<td>.001</td>
<td>-.020</td>
</tr>
<tr>
<td>PSES1011</td>
<td>-.344</td>
<td>.013</td>
<td>-.572***</td>
</tr>
<tr>
<td>PWHITE1011</td>
<td>.171</td>
<td>.012</td>
<td>.288***</td>
</tr>
<tr>
<td>PSPED1011</td>
<td>-.221</td>
<td>.044</td>
<td>-.085***</td>
</tr>
</tbody>
</table>

Notes: Adjusted R- Square = .673; *p ≤ .050; **p ≤ .010; ***p ≤ .001

Table 18 shows that enrollment size is not a significant predictor of fifth grade reading performance in 2010-2011. The other three variables are significant however, with both socioeconomic status and special education status showing a negative association with outcomes. PWHITE, again, is the only independent variable that is positively associated with reading performance.

**2010-2011 Mathematics**

Table 19 presents the results for the regression analysis predicting fifth grade mathematics performance outcomes for the 2010-11 school year.
Table 19

Summary of Regression for Variables Predicting Mathematics Performance Outcomes
(n=1,418)

<table>
<thead>
<tr>
<th>Independent Variable/Year</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>PENR1011</td>
<td>.000</td>
<td>.002</td>
<td>.002</td>
</tr>
<tr>
<td>PSES1011</td>
<td>-.426</td>
<td>.017</td>
<td>-.580**</td>
</tr>
<tr>
<td>PWHITE1011</td>
<td>.189</td>
<td>.015</td>
<td>.261***</td>
</tr>
<tr>
<td>PSPED1011</td>
<td>-.197</td>
<td>.056</td>
<td>-.062***</td>
</tr>
</tbody>
</table>

Notes: Adjusted R-Square = .639; *p ≤ .050; **p ≤ .010; ***p ≤ .001

Table 19 indicates that enrollment size is not a significant predictor of mathematics outcomes. The other three independent variables are significant predictors, however PWHITE is the only variable demonstrating a positive association with mathematics scores.

Comparison of Charter Filtered Scores with Scores for Traditional Public Schools

The regression analyses described above were used to produce filtered performance measures to compare charters to traditional public schools. To create filtered scores we predicted charter school performance using the slopes and intercepts obtained from the regression using data from traditional public schools. In conceptual terms, this process represents an attempt to create a level playing field (i.e., to account for demographic differences in enrollment between charter and traditional public schools)
from which to analyze the data. Technically, the computation is created for both reading and mathematics in each year of the data set.

T-tests were then used to quantify the magnitude of difference between charter school performance using filtered scores and traditional school performance using actual scores. The tables below report results from those t-tests. Table 20 presents annual mean differences for reading, and Table 21 depicts annual mean differences in mathematics. Results are discussed in the text that follows the tables.

Table 20

*T-test Summary: Reading*

<table>
<thead>
<tr>
<th>Year</th>
<th>T</th>
<th>df</th>
<th>Sig (2-tailed)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-2006</td>
<td>-4.924</td>
<td>31</td>
<td>0.000</td>
<td>-11.96326</td>
</tr>
<tr>
<td>2006-2007</td>
<td>-3.584</td>
<td>41</td>
<td>0.001</td>
<td>-9.73236</td>
</tr>
<tr>
<td>2007-2008</td>
<td>-4.152</td>
<td>39</td>
<td>0.000</td>
<td>-9.98485</td>
</tr>
<tr>
<td>2008-2009</td>
<td>-3.079</td>
<td>56</td>
<td>0.003</td>
<td>-7.03840</td>
</tr>
<tr>
<td>2009-2010</td>
<td>4.511</td>
<td>61</td>
<td>0.000</td>
<td>-9.41781</td>
</tr>
<tr>
<td>2010-2011</td>
<td>-0.809</td>
<td>70</td>
<td>0.421</td>
<td>-1.67163</td>
</tr>
</tbody>
</table>
Table 21

*T-test Summary: Mathematics*

<table>
<thead>
<tr>
<th>Year</th>
<th>T</th>
<th>df</th>
<th>Sig (2-tailed)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-2006</td>
<td>-5.469</td>
<td>31</td>
<td>.000</td>
<td>-17.12059</td>
</tr>
<tr>
<td>2006-2007</td>
<td>-4.262</td>
<td>41</td>
<td>.000</td>
<td>-11.81781</td>
</tr>
<tr>
<td>2008-2009</td>
<td>-4.372</td>
<td>56</td>
<td>.000</td>
<td>-10.10189</td>
</tr>
<tr>
<td>2009-2010</td>
<td>-4.253</td>
<td>61</td>
<td>.000</td>
<td>-10.54887</td>
</tr>
<tr>
<td>2010-2011</td>
<td>-1.544</td>
<td>70</td>
<td>.127</td>
<td>-3.37114</td>
</tr>
</tbody>
</table>

**2005-2006**

For the 2005-2006 academic year, the ODE website reported 32 charter schools with complete data. A t-test comparison between actual traditional public school scores and filtered charter schools scores revealed that charter schools performed lower in both reading and mathematics.

**2006-2007**

ODE reported 42 charter schools with complete data in 2006-2007. T-test results comparing actual traditional public school scores to charter schools showed that charters underperformed as compared to their traditional public school counterparts in both...
reading and in mathematics. As in 2005-2006, charter school reading scores were higher than those in mathematics.

2007-2008

In 2007-2008, the number of charter schools with complete data on the ODE website was 40. The data indicates that charter schools are continuing to perform at a lower level than traditional public schools in both reading and mathematics.

2008-2009

The number of charter schools with complete data increased to 57 in 2008-2009. Although the data continued to show charter schools scoring lower than traditional public schools, the amount by which they were underperforming began to decrease. T-scores for reading dropped to -3.079 (-4.152 the previous year) and mathematics decreased slightly to -4.372 (-4.857 in 2007-2008).

2009-2010

Sixty-two charter schools reported complete data on the ODE website for 2009-2010. A summary of the data revealed that charter schools continued to underperform in both subjects as compared to traditional public schools.

2010-2011

Seventy-one charter schools were included in the analysis for 2010-2011. The data shows evidence that charter schools are performing at approximately the same level as traditional public schools in both reading and mathematics.
Effect Size

Effect size is “an objective and (usually) standardized measure of the magnitude of an observed effect” (Field, p. 785, 2009). Here, Pearson’s correlations coefficient, $r$, is used as a statistic to measure effect size. In this study, the effect size represents a measure of the strength of the association between performance outcomes (fifth grade reading and mathematics performance) and school status (i.e., charter versus traditional public school). The larger the effect size, the stronger the association and the more likely that differences in achievement outcomes are related to school status. Conversely, smaller effect size (weaker association) is an indicator that score differences are less likely to be related school status. Effect sizes for fifth grade reading and mathematics are provided in the following table:

Table 22

<table>
<thead>
<tr>
<th>Subject</th>
<th>2005-06</th>
<th>2006-07</th>
<th>2007-08</th>
<th>2008-09</th>
<th>2009-10</th>
<th>2010-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>.44</td>
<td>.24</td>
<td>.31</td>
<td>.14</td>
<td>.25</td>
<td>.01</td>
</tr>
<tr>
<td>Mathematics</td>
<td>.49</td>
<td>.30</td>
<td>.38</td>
<td>.25</td>
<td>.23</td>
<td>.03</td>
</tr>
</tbody>
</table>

Generally speaking, the trend over time suggests that the longer charter schools are in existence in Ohio, the weaker the relationship between charter school status and achievement outcomes. In other words, when adjusting for salient demographic characteristics, charter schools begin to perform more like traditional public schools over time.
Chapter Summary

The purpose of this study was to investigate charter versus traditional public school performance in Ohio. To accomplish this task, descriptive statistics were used to summarize basic features of the study, including the sample and measures. Next, regression models were employed in reading and mathematics for the purpose of computing slope and intercepts to create filtered scores that attempt to account for differences in school and student characteristics. Two of the four predictor variables exerted the most influence over reading and mathematics scores: ethnicity (PWHITE) and socioeconomic status (PSES). Special education (PSPED) status was less significant; enrollment size (PENR) was the least significant of the predictor variables. T-tests were used to compare actual reading and math scores for traditional public schools with filtered reading and mathematics scores for charter schools in each of the six years of data. Results suggest that when adjusting for salient characteristics associated with student achievement, charter schools narrow the gap with traditional public schools over time, performing at essentially the same level as traditional public schools in reading and mathematics by the final year of the study. Chapter five discusses the implications of the study.
Chapter 5: Summary of Findings, Discussion, and Recommendations

Introduction

This chapter examines the results of the study and interprets them in light of the purpose and research questions originally proposed. The first section provides an overview of the major findings, including discussions of each of the four variables used to predict reading and mathematics achievement. The second section offers an interpretation of the findings and discusses relationships between those findings and the extant literature on achievement in charter schools and the influence of time on charter school performance in Ohio, specifically. The third section discusses implications for charter school policy in Ohio. The fourth section offers recommendations for future research, and a chapter summary reviews key points.

Major Findings

The purpose of this study was to investigate student achievement in Ohio charter schools as compared to student achievement in traditional public schools and to analyze the effect of time on achievement. Research questions asked 1) how does student achievement in Ohio’s public charters compare to that of traditional public schools in the state and, 2) do Ohio’s charter schools show increased student achievement over time? The research design controlled for predictors of student achievement that are generally recognized in the research literature: socioeconomic status, ethnicity, special needs status, and school size. Multiple regression analysis was employed using school-level data obtained from the Ohio Department of Education. Outcomes from the regression analyses were used to compute filtered scores (2002) that were then compared to scores at
traditional public schools. In analyses using the entire dataset (i.e., the entire population of schools with all necessary data available, including outliers), the trend indicated non-significant results for enrollment size as a predictor variable for reading and mathematics achievement in fifth grade. With the exception of mathematics in 2005-2006 and 2006-2007, special education was found to be a significant predictor. Only ethnicity and socioeconomic status were consistently significant predictors of reading and mathematics achievement. Goodness-of-fit for the regression models was assessed using the R-squared statistic. The basis for the goodness-of-fit measure was how well the data predicted by the models corresponded to the actual data collected (Field, p. 786). Results indicated that the models explained considerable variance in the dependent variables of interest.

An ancillary analysis was conducted to investigate the influence of time on fifth grade achievement in reading and mathematics. Employing the null hypothesis that the difference between actual scores for traditional schools and filtered scores for charter schools would be zero if public charters were performing as well as traditional public schools, T-test statistics were computed and examined. Over time, and as the number of operational public charters increased, T-test results confirmed that charter school performance in Ohio improved in relation to the performance of traditional public schools; indeed, in the sixth year of the study, the level of charter school achievement approximated that of traditional public schools.

The following section considers each of the four predictor variables and their influence on reading and mathematics achievement from 2005-2011.
**Total Enrollment (PENR).** In general, school size, operationalized as total enrollment, was not found to significantly influence student achievement. Interestingly, for 2006-2007 reading and 2007-2008 reading and mathematics, enrollment was a significant factor at p=.041, p=.046, and p=.013 respectively. Beginning in 2008-09 in both reading and mathematics, school district size was non-significant as a predictor.

**Socioeconomic Status (PSES).** Socioeconomic status was consistently significant as a predictor for both reading and mathematics achievement (p = .000) during each of the six years of the study. Charter schools in Ohio enroll greater numbers of economically disadvantaged students than do traditional public schools, as is evidenced in the descriptive findings section of chapter four. In 2010-2011, for example, the mean percent of economically disadvantaged students enrolled in traditional public schools was 46.97, while in charter schools it was 74.94. These findings are consistent with a 2009 study by the Center for Education Reform reporting that Ohio’s charter schools primarily enroll economically disadvantaged and minority students. The data is inconsistent with a National Education Association report (2004) stating that low-income and minority students perform better at traditional public schools than charters. Current findings indicate that, over time, these students will perform as well in charters as in traditional public schools.

**Ethnicity (PWHITE).** Along with socioeconomic status, ethnicity was the only other independent variable consistently significant (p = .000) as a predictor of reading and mathematics achievement from 2005-2011. The mean percentage of white students in traditional public schools was 81.22 in 2005-2006 and 78.82 in 2010-2011. At charter
schools it was 49.60 in 2005-2006 and 44.82 in 2010-2011. This finding is consistent with studies by Cobb and Glass (1999) and Frankenberg and Lee (2003) which found significant differences in racial demographics between charter schools and even their closest neighborhood school. Charter schools in Ohio enroll significantly greater numbers of minority students than do traditional public schools.

**Special Education Status (PSPED).** The special needs student variable was significant in predicting achievement except in 2005-2006 and 2006-2007 mathematics at levels of .307 and .927. Beginning in 2007-2008, special education status was consistently significant in predicting both reading and mathematics achievement. The mean range for percentage of special needs students in traditional public schools was 15.25 in 2005-2006 to 15.37 in 2010-2011. At charter schools the mean range was 18.60 in 2005-2006 and 17.05 in 2010-2011. These findings are consistent with studies by Corwin and Flaherty (1995) and Finn and colleagues (1996) demonstrating the overrepresentation of special needs students in charter schools.

**Interpretation and Discussion**

The literature review in chapter two was divided into three sections: (1) literature on charter school achievement across the country, (2) a review of the limited evidence on charter school performance to date, and (3) evidence of charter school achievement in Ohio. This section of chapter five interprets and discusses findings from the current study within the context of potential contributions to the knowledge base in those three areas.

**Charter School Achievement in America.** Chapter two characterized the research on charter school achievement in America as sizeable but mixed in terms of the reported
outcomes for charter schools versus traditional public schools. Moreover, longitudinal studies that distinguish between selection factors (public charter versus traditional public) and the value that each type of school contributes to student achievement were rare. This dissertation focused on time as a variable influencing student achievement, while controlling for demographic differences in charter school enrollment including socioeconomic status, ethnicity, and special education status. Findings generally affirm studies that report increases in public charter school scores over time and extends the extant literature relative to demographic variables impacting achievement.

Inspired by a 2002 study using a similar methodological approach (Miron, Nelson, & Risley), this dissertation compared fifth grade reading and mathematics scores at charter and traditional public schools in Ohio. The adapted methodology attempts to equalize demographics within charter and traditional public schools to allow for a leveling of the playing field and a more telling comparison. Findings tend to be consistent with charter school studies in the extant literature that are longitudinal in nature, indicating that public charter schools improve over time and in many cases catch up to, or exceed, performance levels in traditional public schools (Green, Forster & Winters, 2003; Hoxby, 2004; Hoxby & Muraka, 2007; Hoxby, Muraka & Kang, 2009; Loveless, 2002, 2003; Miron & Nelson, 2000; Miron, Nelson, & Risely, 2002; Raymond, 2010).

Studies Depicting Evidence of Charter School Performance. The review of research on panel (individual student), cohort (a group of students), and snapshot studies (performance at one specific point in time) suggested that investigating charter school performance over several years’ time, while adjusting scores to account for demographic
differences, was a largely uncommon method for comparing charter and traditional public school performance. Moreover, the use of inferior methods to gauge performance has produced negative charter school results that might more logically be explained by the complexities of charter school start-up operations and inequities inherent in charter schools (Bifulco & Ladd, 2006; Gleason, Clark, Clark Tuttle, & Dwoyer, 2010; Nelson, Rosenberg, & Van Meter, 2004; Raymond, 2009).

The consideration of multiple variables across time combined with adjusting scores to account for differences in charter versus traditional school enrollment demographics facilitated a more accurate composite of performance than is generally found in the extant literature. Studies using less rigorous methodological processes fail to provide reliable evidence to inform our understanding of charter school performance. The current study demonstrates not only how charter school achievement progresses over time relative to that of traditional public schools, but also how demographic characteristics influence charter school performance. Socioeconomic status, ethnicity, and special education status all moderate student achievement in charter schools. These findings extend the literature on charter school performance by identifying the factors that influence student achievement and accounting for these disparities in achievement outcomes.

**Charter School Achievement in Ohio.** Findings in the extant literature with regard to performance among Ohio’s charter schools are mixed, largely due to methodological differences and length of the study (i.e., snapshot studies of a particular point in time versus longitudinal studies over several years). Among the snapshot studies
investigating achievement on state exams for one year (Jenkins, 2005; Legislative Office of Educational Oversight, 2002; Porch, Phillips-Schwartz, & Ryan, 2005) none found charter schools to be performing better than traditional public schools. The two cohort studies yielded dissimilar results: Carr and Staley (2005) found mixed results; Miron, Coryn, and Mackety (2007) reported lower scores at charter schools but growth increasing over time. Zimmer’s 2009 panel study used a longitudinal approach and found that students transferring into charter schools were much lower performing that were their former peers and that their performance improved over time. The current study affirms Zimmer’s findings and extends the knowledge base with the use of filtered scores to account for demographic differences between charter and public school students.

**Implications for Educational Policy in Ohio**

As discussed in chapter two of this dissertation, H.B. 1 mandated the automatic closure of charter schools the state considers to be underperforming, primarily on the basis of academic scores. Beginning on July 17, 2009, Ohio Revised Code (ORC) 3314.35 closes schools based on the following:

1) For schools that do not offer a grade higher than 3, requires closure if the school has been in academic emergency for three of the four most recent years, [instead of four years as previously mandated];

2) For schools that offer any of grades 4 to 8 but no grade higher than 9, requires closure if the school has been in academic emergency for two of the three most recent years, and has shown less than one year of academic growth in reading or math for at least two of the three most recent years; and
3) For schools that offer any of grades 10 to 12, requires closure if the school has been in academic emergency for three of the four most recent years, instead of three consecutive years with two years not showing academic growth in reading or math (Ohio Department of Education, 2009, p. 9-10).

The findings in the current study should be considered by policymakers to create legislation that takes into account the significant demographic differences between public charter and traditional public schools that affect student achievement. Further, legislation should incorporate the effects of time and growth in assessing public charter school performance.

Findings in chapter four identified socioeconomic status, ethnicity, and special education status as exerting a significant influence on reading and mathematics achievement. These findings concur with results reported in the extant literature (Cobb & Glass, 1999; Corwin & Flaherty, 1995; Finn, 1996; Green, Forster, & Winters, 2003; Miron, Nelson, & Risley, 2002) and extend it by illustrating the degree to which each of these disparities influence achievement.

Time was an essential factor in the current study to demonstrate that charter schools improve their performance as they mature. Although several studies deployed time as a variable in studying charter schools, the literature search conducted for this project produced no current longitudinal studies that examine results over six years. The trend in the extant literature concludes that achievement at charter schools improves over time (Barr, 2007; Loveless, 2003; Raymond, 2009; Zimmer, Blank, Gill, & Christman, 2008; Zimmer, Gill, Booker, Lavertu, Sass, & White, 2009) and—in the Miron, Nelson,
and Risley longitudinal study (2002)—scores adjusted for demographics indicated that charter schools would catch up to traditional public school levels. The current study affirms these results and extends it by reporting annual achievement improvements among charter schools and describing a narrowing of the achievement gap between charters and traditional public schools over time.

The extant literature indicates that few researchers have used a sophisticated process as did Miron, Nelson, and Risley in order to provide filtered scores which could then be compared to actual scores to show annual growth. If the goal is to more accurately measure achievement, then the use of this feature is critical in gauging actual growth while controlling for demographics. Referring again to the Miron, Nelson, and Risley study of Pennsylvania’s charter schools in 2002, it was found that the average charter school performed just 36 points lower than traditional public schools on a scale ranging from 1000-1600. The researchers noted that without the demographic filters the score difference would have been 140 points lower. The current study reports findings commensurate with the 2002 study and extends it by using an alternative methodology to create filtered scores for tracking and analyzing student growth and achievement over time.

Policy Recommendations

Findings from this study and previous related research indicate that charter school achievement approximates that of traditional public schools over time. That it takes time for charter schools to make up ground is reasonable considering the complexities inherent in start-up operations and the fact that enrollment in Ohio’s charter schools is primarily
economically disadvantaged, minority students whose performance at their prior traditional public school was much lower than their peers, according to statistics from the ODE database. The Ohio legislature has not recognized these factors or the substantially different enrollment demographics at charter schools (specifically, demographic factors that are associated with achievement). The passage of House Bill 1 and the subsequent automatic closure of charter schools raises several issues and concerns. Accordingly, the following specific policy recommendations are offered:

Recommendation 1: Redistribute funds to charter schools. Since the trend is for minority, economically disadvantaged, and special needs students to score lower than white students (for a variety of reasons) and public charters enroll greater numbers of students in these sub-groups, remediation will necessitate a corresponding increase in expenses (Card & Krueger, 1992; Grissmer et al., 1994; Hanushek, 1994; Hedges et al., 1984; Levin, 1994). Currently, public charter schools in Ohio receive up to 40% less funding than traditional public schools (Fordham Foundation, 2005).

Recommendation 2: Revise legislation to properly assess school-wide achievement using methodological approaches that include filters to control for inequitable demographics at charter schools and that are longitudinal so as to assess the achievement at mature charter schools that have been operational for at least six years. A commonly held belief among educators is that it takes three to five years to see a significant improvement in achievement (Nathan, 1999). Current Ohio legislation marks schools for closure after their second year of operating within Academic Emergency. The current study found that due to demographic differences in enrollment at charter versus
traditional public schools, it took public charter schools six years to perform at equivalent levels. This finding is much more in line with the three to five years paradigm to which educators frequently profess.

Recommendation 3: Since charter schools in Ohio approximate performance in traditional public schools, the legislation should be revised to treat both types of institutions similarly in the event of inadequate performance progress. To do otherwise may risk the appearance of discriminating against federally protected classes of people whose parents freely chose to enroll them in public charter schools which are primarily dominated by minority and poor students.

Recommendations for Further Research

Recommendations for further research include studies that would extend and offer additional specificity regarding our understanding of charter school achievement.

First, researchers might consider additional variables that influence student achievement. In the current study, the variables selected for the study accounted for a fairly large portion of the variance in student achievement, but a more fully specified model might produce more explanatory power. For the six reading models, the $r^2$ value ranged from .530 to .674 (depending on the year of analysis). For the six mathematics models, the range of $r^2$ values was .494 to .640. Additional variables should be considered to investigate other school, students, and family characteristics that may impact student achievement such as the effect of teacher expectations, familial educational attainment, and peer relations.
Funding mechanism differences between charter and traditional public schools should also be explored as a variable that may impact the length of time until charters approximate the achievement of traditional public schools. Traditional public schools have definitive advantages over charters in Ohio’s current funding stream. First, charters receive significantly less money with which to educate children who, because of their inclusion in subgroups including poverty, minority, and special needs, require greater funds to remediate. The funding for public charter schools in Ohio is limited to state aid and whatever federal funds they are awarded. Traditional public schools receive these funds plus various local and state taxes. This difference can equal a shortfall of close to one million dollars each year for each of Ohio’s public charter schools if these schools receive 40% less funding than traditional public schools (Fordham Foundation, 2005).

In addition to examining school revenues, the influence of expenditures on charter public versus traditional public schools could provide information relative to the actual cost of educating a student.

Qualitative analyses investigating the perceptions of students, families and school personnel in charter and traditional public schools might also highlight the processes, attitudes, and perceived advantages among the two institutions that influence achievement.

In addition to exploring alternative variables that impact achievement, alternative research models may be employed to confirm and extend current findings. Combining a growth model in tracking individual student achievement over at least six years would provide more specific information, such as how motility influences achievement. It
would also help to gauge, specifically, the impact of prior achievement on long-term gains. Ideally, a quantitative study using lotteried-in and lotteried-out results would be developed. Since demand for charters in Ohio isn’t yet great enough to support a lotteried-in/lotteried out approach (Hoxby, Kang & Muraka 2009), a quantitative study tracking individual student achievement over time would be informative. At present, Ohio is in the process of establishing a student-level database that could be used for this purpose.

An informative study could be developed that examines the differences in achievement among stand-alone charter schools, charter schools with management companies, and charter schools that are associated with a local school district.

Future researchers might also use the data base from the current study to investigate results at other grade levels. In the current study, since more elementary charter schools exist in the state and are therefore closed more frequently, fifth grade was selected for analysis. It could be useful to determine if, using the same variables, achievement gaps narrowed more quickly at the high school level. Graphics for all other state-tested grades can be found in the Appendix.

Similarly, researchers could use the current database and variables to compare extant results to another Great Lakes state. Michigan, Illinois, Indiana, Wisconsin, Minnesota, New York, and Pennsylvania have passed charter school legislation. Generalizability of current results to other regional states would add to the knowledge base on charter school achievement.
The findings in this study suggested that socioeconomic status, minority status, and special education status all impacted achievement at various levels in charter schools. Future research might be conducted that explores the interaction of these variables (i.e., do minority students achieve at higher levels in schools of predominantly low socioeconomic status?). Such outcomes might influence the ways in which we educate students as well as how we view segregated schools.

Summary

The purpose of this study was to investigate reading and mathematics achievement among fifth graders and to compare the results over time between charter and traditional public schools. Multiple regression was used to produce filtered scores that allowed for comparing charter and traditional public school performance while accounting for salient demographic differences. T-tests were used to compare results over time. Chapter five provided a summary and interpretation of the study results.

As described in the chapter, findings suggest that socioeconomic status, minority status, and special education status significantly influence achievement in Ohio’s charter schools. At the six-year point, charter school achievement approximated that of traditional public schools. Descriptive statistics also revealed that these schools serve higher percentages economically disadvantaged and minority students who initially score much lower on state examinations than the peers they left behind in their neighborhood public schools. These findings were interpreted to recommend that funds be redistributed to help remediate students and that Ohio revise the schedule and nature of its charter school closure policy.
Following the discussion of findings, the contribution of the current study was examined from the perspective of how it relates to three extant literatures (i.e., charter school achievement in America, evidence of charter school achievement to date, and, evidence of charter school achievement in Ohio). Findings in the current study affirm several of these studies. The current study extends the knowledge base regarding charter school achievement by using methodology that equalizes demographic disparities between charters and non-charters. Additionally, it reveals variables that are most likely to influence achievement and discovers a time frame in which fifth grade charter school achievement approximates that of traditional public schools.

A separate section of chapter five offered policy recommendations for the state of Ohio. These recommendations focused on the redistribution of funds to schools serving disadvantaged populations requiring greater funding for remediation, revising the methods by which charter achievement is measured, and revising legislation to treat all educational institutions similarly in the event of inadequate academic performance.

A section on recommendations for future research focused primarily on the inclusion of additional student, school, and family level variables known to influence student achievement, exploring the impact of Ohio’s current funding methodology to charter schools as a variable that may impact the length of time until charter achievement approximates that of traditional public schools, and exploring how one variable affects another to determine, for example, whether minority students achieve at higher rates in schools with a higher or lower socioeconomic status.
Finally, a section on recommendations for future research highlighted the desirability of comparing findings of the current study to findings in other Midwestern states in order to inform the generalizability of results.
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Appendix: Mean Scores for Mathematics and Reading for Sixth through Eighth Grades and Grade Ten

Figure A1. Mean scores for sixth grade reading at public charter and traditional public schools.

Figure A2. Mean scores for sixth grade mathematics at public charter and traditional public schools.
Figure A3. Mean scores for seventh grade reading at public charter and traditional public schools.

Figure A4. Mean scores for seventh grade mathematics at public charter and traditional public schools.
Figure A5. Mean scores for eighth grade reading at public charter and traditional public schools.

Figure A6. Mean scores for eighth grade mathematics at public charter and traditional public schools.
Figure A7. Mean scores for tenth grade reading at public charter and traditional public schools.

Figure A8. Mean scores for tenth grade mathematics at public charter and traditional public schools.