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Differences between Charter Elementary Schools and Traditional Elementary Schools in Their Grade 4 Mathematics Performance: A Texas Multiyear Investigation

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Abstract

In this statewide, multiyear analysis, the extent to which differences in mathematics achievement among Grade 4 students by school type (i.e., traditional or charter) were present was determined. Specifically examined was the relationship between performance and the three State of Texas Assessment of Academic Readiness (STAAR) Mathematics Performance Indicators for Grade 4 students during the 2015-2016 through the 2017-2018 school years. Statistical analyses revealed significant differences in mathematics achievement across school types. In every instance, Grade 4 students enrolled in charter schools did not perform as well as those enrolled in traditional schools. Results were consistent across all three school years and across all three STAAR Mathematics Performance Indicators. Considering the substantial increase in both the number of charter schools in Texas and the number of charter school students, and the poor performance of charter schools, these findings are cause for concern. Implications of these findings and recommendations for future research are discussed.

Keywords: *Charter schools, Traditional schools, Texas, Grade 4, STAAR, Mathematics, Performance indicators, Approaches grade level, Meets grade level, Masters grade level*

1. Introduction

A decade after the first charter school in the United States began operation, the professional literature is replete with research articles on the effects, both positive and negative, of charter schools [1][2][3][4][5]. Charter school supporter Hinojosa [6] contended that charter schools would expand the number and variety of school-choice options available to parents and students. Charter school supporters [7][8] also asserted that charter schools would foster innovation, promote competition with traditional public schools, and improve students' academic achievement. In contrast, however, opponents of charter schools claimed that charter schools would result in increased segregation, reduce financial and human resources in traditional schools, and would not lead to statistically significant improvements in academic achievement [9][10]. Amid the national controversy over charter school effectiveness, several studies were conducted to assess it.

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Bifulco and Ladd [7] examined the effects of North Carolina charter schools using approximately 6,000 Grade 4 through Grade 8 End-of-Grade reading and mathematics assessment results. Reading and mathematics test data were compared for students enrolled in charter schools and in traditional schools. The results showed that the academic gains students made in charter schools were considerably lower than those in traditional schools. The Bifulco and Ladd [7] study was replicated in 2006 by Bifulco and Ladd using 8,700 student scores. Bifulco and Ladd [11] established the same results. Students in traditional schools made greater academic gains than their peers in charter schools. This result was similar to a study performed a year later in California.

Crane and Edwards [12] analyzed California's charter school performance data from 183 charter elementary schools serving approximately 78,000 students and 4,965 traditional elementary schools serving approximately 3 million students. After the researchers controlled for differences in enrolment and student characteristics, they established that students enrolled in charter elementary schools scored about nine points lower than their peers in traditional elementary schools on the California state-mandated assessment. This outcome was later supported by Orfield and Luce [13].

Orfield and Luce [13] examined student performance in Chicago charter schools by analyzing data from the 2012-2013 and 2013-2014 school years, including state assessment scores, graduation rates, and ACT scores [14][15][16]. Orfield and Luce [13] documented that students in Grades 3-8 in Chicago charter schools had lower reading and mathematics scores than their peers in traditional schools. The achievement gap between students in charter schools and those in traditional schools in Chicago widened from the first to the second year.

Winters [17] published the results of seven studies analyzing New York charter schools. In five of the studies, a randomized field trial design was used, in which data were analyzed only for students who entered the lottery to attend New York Charter schools. Data on students who were randomly granted entry into the Charter School system were compared to data on students who were randomly denied the opportunity to enrol in the Charter School system. Winters [17]determined that, on average, students attending a charter school scored higher in mathematics and English language arts than they would have had they attended a traditional public school.

Similarly, the Center for Research on Educational Outcomes [18] used a matching design to compare the performance of each student attending a charter school with a similar student attending a traditional public school in New York City. The Center for Research on Educational Outcomes researchers documented that 47.7% of the city's charter schools produced statistically significant gains in mathematics and reading compared to traditional public schools. Approximately one-third of New York charter and traditional schools scored equally well, and 17% of the charter schools scored worse than traditional schools.

With respect to the state of interest for this article, the 75th Texas Legislature passed state laws to authorize the creation of charter schools in 1995. According to the 2016-2017 Charter Authorizer Accountability Report, "The goal of this legislation was to increase innovation in teaching methods, improve student learning, increase options for students and families within the public school system, and create professional opportunities which attract new teachers to the public school system" (p. 2). The 83rd Legislature, in 2013, after the Senate passed Senate Bill 2, added legislation to the TEC that required a report on the performance of open-enrollment charter school campuses with results compared to the matched traditional public school campuses. Currently in Texas, children attending traditional and charter public schools in Grades 3-12 are assessed yearly with the state-mandated State of Texas Assessment of

Academic Readiness (STAAR). The STAAR results reported by the Texas Education Agency include not only a percentage score but also a passing standard for each student in Grades 4 through 8. The passing standards "relate levels of test performance to the expectations defined in the state-mandated curriculum standards known as the Texas Essential Knowledge and Skills (TEKS)" [19]. The Texas Education Agency sets cut scores to distinguish students' performance levels or categories. All students who participated in the STAAR assessment received a performance level rating for each exam taken. The STAAR performance levels are: Does Not Meet Grade Level, Approaches Grade Level, Meets Grade Level, and Mastered Grade Level.

According to the Charter Authorizer Accountability Report for the 2016-2017 school year, Shield et al. [20] documented that SBOE-authorized charter school campuses had a higher percentage (75%) of students meeting the Approaches Grade Level standard on the 2017 STAAR Reading exam than their matched traditional school students (72%). The same school comparison yielded comparable percentages (76% for both) of students meeting the Approaches Grade Level standard on the 2017 STAAR Mathematics test. When compared to traditional public schools, ISD-authorized charter schools had a comparable percentage (70% vs. 71%) of students achieving the Approaches Grade Level standard on the 2017 STAAR Reading test; however, the ISD-authorized charter schools had a lower percentage (71%) of students achieving the Approaches Grade Level standard on the 2017 STAAR Mathematics exam than their matched traditional school campuses (76%). Students were matched based on several identifying criteria, demographics, economic status, geographical location, and district population. Approximately 71% of the students were successfully matched for inclusion in this study.

Several researchers, Penning and Slate [21], Escalante and Slate [22], and Klammer and Slate [23] have compared the academic performance of various groups of Texas students between charter schools and traditional schools. These groups of researchers have analyzed state-mandated test scores in reading, writing, science, and mathematics, including passing rates. In the first of these three investigations, Penning and Slate [21] compared the demographic characteristics of students enrolled in charter schools with those of students enrolled in traditional schools. They examined the academic achievement of students in these two school types in Texas. They established that, in 2009, approximately 42% of Texas charter school students were Black, and 48% of Texas charter school students were Hispanic. At the same time, traditional public school enrolment in Texas consisted of 14% Black students and 44% Hispanic students. Penning and Slate [21] also determined that more than 70% of students enrolled in charter schools met the criteria for being "at-risk" for dropping out of school, compared to only 41% in traditional schools. Regarding academic performance, Penning and Slate [21] found that students enrolled in Texas charter schools did not perform better than those in traditional public schools; however, students in charter schools showed greater academic growth than those in traditional public schools.

In a more recent study, Escalante and Slate [22] analyzed academic achievement among students in Grades 3, 4, and 5 in Texas charter and traditional elementary schools. Using data from the state-mandated assessments, the STAAR tests on 20,920 students, of which 19,589 students were enrolled in traditional schools, and 1,331 students were enrolled in charter school campuses, the researchers documented that students enrolled in traditional public schools had statistically significantly higher reading, mathematics, writing, and science scores than students enrolled in charter elementary schools. Escalante and Slate [22] established that students in Grades 3 and 4 enrolled in traditional elementary schools had statistically significantly higher passing rates, 4.54% and 2.67%, respectively, on the STAAR Reading

test than students in Grades 3 and 4 who were enrolled in charter schools. Grade 5 students in traditional and charter elementary schools had similar passing rates on the STAAR Reading test. Grade 4 students in traditional and charter elementary schools also had similar passing rates on the STAAR Writing test. Grade 5 students in traditional schools had a higher average passing rate on the STAAR Science test (6.02%) than those in charter schools.

In a more recent investigation, Klammer and Slate [23] analyzed the extent of differences in mathematics achievement between Grade 3 students enrolled in charter elementary schools and those enrolled in traditional elementary schools in the State of Texas. Klammer and Slate [23] analyzed STAAR data from 2015-2016 in two performance categories: Satisfactory Academic Performance and Advanced Academic Performance. In their study, students enrolled in traditional schools in Grade 3 had statistically significantly higher passing rates in both performance categories than their peers enrolled in charter schools. As such, student performance in these three Texas investigations was determined to be statistically significantly better in traditional public schools than in charter schools.

1.1. Statement of the problem

The emergence of charter schools and their rapid growth has created choice for parents and students within the public education system. One possible appeal of charter schools is that their leadership teams and teachers can differentiate instruction, student populations, and programs, and offer students a free education. Because students may voluntarily attend charter schools and have the option to return to their designated public school, charter schools are viable competitors to traditional public schools.

Since the first legislation was passed in 1995 in Texas and the first 17 charter schools were opened in the fall of 1996 with an enrolment of 2,426, the Texas Statewide charter school program has grown to 707 campuses serving 296,323 students, accounting for 5.5% of the total Texas public school population. Charter schools have become a heated political topic among individuals who urge legislatures to promote and support school choice. Supporters of charter schools believe that, because they have greater autonomy, they can use innovative and creative approaches better to meet the needs of their individual student populations.

Active parent engagement in their child's education is a contributing factor to student achievement [24]. Because school choice is primarily dependent on parents seeking and enrolling their child in a charter school, charter schools would likely have higher student achievement based on the parent involvement factor alone; however, this assumption may not be true. Many factors may influence student achievement in a charter school, and parents, policymakers, and educators must have data to make informed decisions that facilitate and support increased academic achievement.

1.2. Purpose of the study

The purpose of this study was to determine the degree to which Grade 4 students enrolled in charter elementary schools differed in their mathematics performance from Grade 4 students enrolled in traditional elementary schools. Specifically addressed were the three grade level standards: Approaches Grade Level, Meets Grade Level, and Master's Grade Level. These analyses were conducted separately for three school years: 2015-2016, 2016-2017, and 2017-2018.

1.3. Significance of the study

Despite the rapid growth of school choice and the availability of grants to charter school start-ups, results are inconsistent regarding the effectiveness of charter schools on student achievement. "Taken in the aggregate, the empirical evidence to date leads one to conclude that we do not have definitive knowledge about the impacts of public charter schools on students and existing schools" [25]. Many of the research outcomes have not been consistent. Many studies report higher student achievement in charter schools than in traditional schools, but other researchers have documented that students enrolled in traditional schools outperform those enrolled in charter schools [1][3][4][22].

As posted on the Texas Foundation School Program website in the 2019-2020 Statewide charter school summary of finances document, over $3 billion in total state funding is estimated from the Foundation School Program and the Available School Fund. Funding for charter schools has increased as school choice advocacy has grown. An example of this trend is the passage of House Bill 21, which, beginning in the 2018-2019 fiscal year, requires Texas public charter schools to collectively receive up to $60 million annually to fund leasing and maintaining buildings and facilities [26]

Although significant time and resources have been devoted to the creation of charter schools, few studies have analyzed student academic achievement in Texas charter schools under the new accountability system's passing descriptors. Instructors and school leaders can use the results of this multiyear investigation to inform policy within charter and traditional schools, as well as inform law and policymakers on the efficacy of charter schools.

1.4. Research questions

The following overarching research question was addressed in this study: What is the difference in Grade 4 STAAR Mathematics achievement of elementary schools as a function of school type (i.e., charter or traditional)? Sub-questions under this research question were: (a) What is the difference in the Grade 4 STAAR Mathematics Approaches Grade Level standard by school type? (b) What is the difference in the Grade 4 STAAR Mathematics Meets Grade Level standard by school type? (c) What is the difference in the Grade 4 STAAR Mathematics Masters Grade Level standard by school type? and (d) What trend is present in the Approaches Grade Level, Meets Grade Level, and Master's Grade Level standards? The first three research questions were addressed separately for each of the three school years: 2015-2016, 2016-2017, and 2017-2018, whereas the fourth research question involved comparisons across all three school years.

2. Method

2.1. Research design

A non-experimental, causal, comparative research design was used for this study [27]. Archival data were analyzed to examine the mathematics proficiency standards of elementary students enrolled in charter or traditional elementary schools in the 2015-2016, 2016-2017, and 2017-2018 school years. The independent variable involved in this research article was school type (i.e., charter elementary school or traditional elementary school), and the dependent variables were the Grade 4 STAAR Mathematics Approaches Grade Level standard, Grade 4 STAAR Mathematics Meets Grade Level standard, and the Grade 4 STAAR Mathematics Masters Grade Level standard for students in the 2015-2016, 2016-

2017, and 2017-2018 school years. Because existing data were analyzed in this multi-year empirical investigation, neither the independent variable (school type) nor the dependent variables (STAAR passing standards) can be manipulated.

To score Approaches Grade Level, students achieved a raw score of 25 questions correct (64% and 59%) on the 2017 and 2018 administrations, respectively, and 24 questions correct (57%) on the 2019 STAAR administration. Students achieved a raw score of 25 questions correct (64% and 59%) on the 2017 and 2018 administrations and 24 questions correct (57%) on the 2019 administration of the STAAR to achieve the Meets Grade Level performance indicator. Students were given a performance indicator of Did Not Meet Grade Level if their raw score was 16 questions correct or fewer (≤ 64% and ≤ 59%) on the 2017 and 2018 administrations, and 17 questions correct or fewer (≤ 25%) on the 2019 administration of the STAAR.

A student who achieves the Master's Grade Level performance standard on Grade 4 STAAR Mathematics is described as being able to: "evaluate and justify the reasonableness of solutions to multi-step application problems involving addition, subtraction, multiplication, and division of whole numbers, and can analyze mathematical relationships to compare and solve problems involving fractions." [28][29]. Students achieved a raw score of 29 questions correct (82% and 79%) on the 2017 and 2018 administrations, and 28 questions correct (79%) on the 2019 administration of the STAAR, to meet the Master's Grade Level performance indicator.

2.2. Participants and instrumentation

For this study, archival data for the 2015-2016, 2016-2017, and 2017-2018 school years for elementary students enrolled in either charter or traditional elementary schools were requested from the Texas Education Agency. A Public Information Request form was previously submitted to and fulfilled by the Texas Education Agency Public Education Information Management System for these data. The STAAR Mathematics passing standards of Approaches Grade Level, Meets Grade Level, and Master's Grade Level during these school years were the specific data analyzed for this study. Elementary students were specifically selected for this study because Grade 4 is the year before the first Student Success Initiative year, Grade 5, in which students must pass the STAAR to be promoted to Grade 6.

Each performance category, Approaches Grade Level, Meets Grade Level, and Master's Grade Level, is aligned to academic language that describes the students' achievement in mathematics. All scores and performance indicators are reported by the state for individual students, as well as by demographic information and economic status. A student who achieves the Approaches Grade Level performance standard on Grade 4 STAAR Mathematics is described by Texas Education Agency (2019a) as being able to: (a) represent, compare, and order whole numbers, decimals, and fractions, and understand relationships related to place value, (b) represent and solve problems involving addition, subtraction, multiplication, and division of whole numbers including two-step problems, (c) represent addition and subtraction of fraction problems with pictorial models, (d) represent and solve problems using data and tables, and (e) use a protractor to measure angles and a ruler to measure lengths.

A student who achieves the Meets Grade Level performance standard on Grade 4 STAAR Mathematics is described by Texas Education Agency as being able to: (a) solve application problems involving addition, subtraction, multiplication, and division of whole numbers, including two-step problems and problems with a letter representing the unknown, (b) solve

and explain multi-step addition and subtraction problems involving money, (c) compare fractions using symbols and justify relationships to the whole, (d) represent numerical relationships and patterns with models and tables including input-output tables, (e) select units and solve problems involving measurement including conversions, (f) apply knowledge of parallel and perpendicular lines to classify two-dimensional shapes, and (g) solve application problems involving perimeter and area including missing measurements. A student who achieves the Did Not Meet Grade Level performance standard on Grade 4 STAAR Mathematics is described by Texas Education Agency [29] as being able to: (a) identify points represented by decimals and fractions on a number line, (b) represent decimals using expanded notation, (c) use models to represent and solve problems involving multiplication and division of whole numbers, and (d) identify lines of symmetry and types of angles.

4. Results

To determine whether differences existed in Grade 4 Mathematics STAAR performance indicators (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) between students enrolled in charter elementary schools and those enrolled in traditional elementary schools, Pearson chi-square procedures were conducted. This statistical procedure was considered optimal because frequency data were available for mathematics performance indicators and school type. As such, chi-squares are the statistical procedure of choice when both variables are categorical. Additionally, with the large sample size, the available sample size per cell was more than five. Therefore, the assumptions underlying a chi-square test were met [30].

4.1. Approaches grade level results

For the 2015-2016 school year, a statistically significant difference was revealed, $\chi 2(1) = 358.40$, $p < .001$. The effect size for this finding, Cramer's V, was small (.04; Cohen, 1988). A statistically significantly higher percentage, 8.3 percentage points higher, of Grade 4 students who were enrolled in traditional elementary schools met the Approaches Grade Level performance standard than Grade 4 students who were enrolled in charter elementary schools. Table 1 contains the descriptive statistics for this analysis.

Table 1. Descriptive statistics for the STAAR grade 4 mathematics approaches grade level standard by school type for the 2015-2016, 2016-2017, and 2017-2018 school years

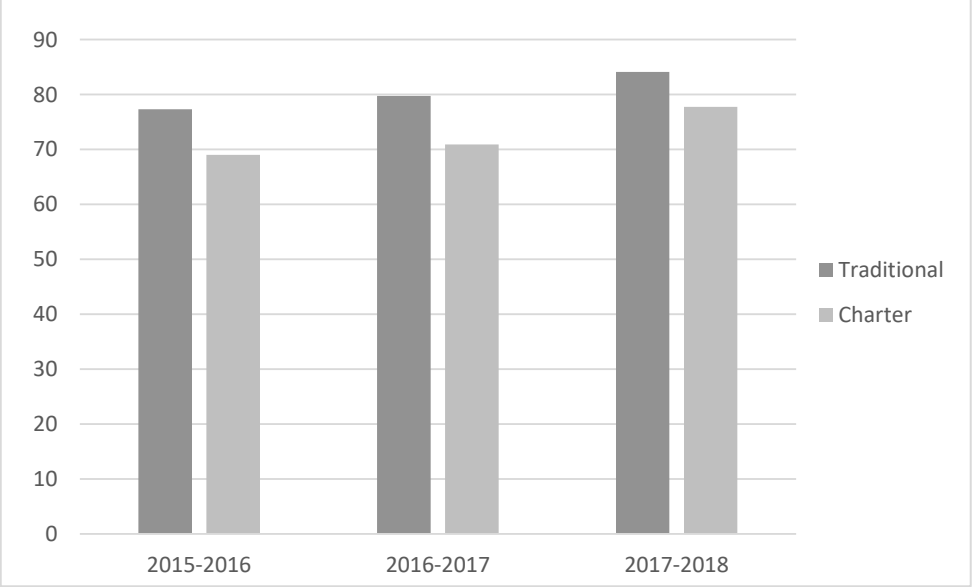
	Did Not Meet Standard		Met Standard	
School Year and School Type	*n*	%	*n*	%
2015-2016				
Traditional	45,961	22.7	156,603	77.3
Charter	3,002	31	6,687	69
2016-2017				
Traditional	42,138	20.3	165,174	79.7
Charter	3,045	29.1	7,418	70.9
2017-2018				
Traditional	28,349	15.9	149,711	84.1
Charter	2,239	22.3	7,794	77.7

Concerning the 2016-2017 school year, a statistically significant difference was observed, $\chi^2(1) = 466.61$, $p < .001$, Cramer's V = .05, a small effect size [31]. Similar to the 2015-2016 school year, a statistically significantly higher percentage, 11 percentage points higher, of

Grade 4 students who were enrolled in traditional elementary schools met the Approaches Grade Level performance standard than Grade 4 students who were enrolled in charter elementary schools. Delineated in Table 1 are the descriptive statistics for this analysis.

For the 2017-2018 school year, a statistically significant result was observed, $\chi^2(1) = 328.30$, $p < .001$, with a Cramer's V of .04, a small effect size [31]. Congruent with the first two school years, a statistically significantly higher percentage, six percentage points higher, of Grade 4 students who were enrolled in traditional elementary schools met the Approaches Grade Level performance standard than Grade 4 students who were enrolled in charter elementary schools. Revealed in Table 1 are the descriptive statistics for this analysis. In the 2015-2016 and 2016-2017 school years, Grade 4 students enrolled in traditional schools met the Approaches Grade Level standard by over eight percentage points compared to those enrolled in charter schools. In the 2017-2018 school years, Grade 4 students enrolled in traditional schools met the standard by over six percentage points compared to those enrolled in charter schools. These results are depicted in Figure 1.

Figure 1. Percentages of students who met the approaches grade level standard on the grade 4 STAAR mathematics exam for the 2015-2016 through the 2017-2018 school year by school type.



Meets Grade Level Results

For the 2015-2016 school year, a statistically significant difference was revealed, $\chi2(1) = 359.13$, $p < .001$, Cramer's V = .04, a small effect size [31]. A statistically significantly higher percentage, 9.8 percentage points higher, of Grade 4 students who were enrolled in traditional elementary schools met the Meets Grade Level performance standard than Grade 4 students who were enrolled in charter elementary schools. Table 2 contains the descriptive statistics for this analysis.

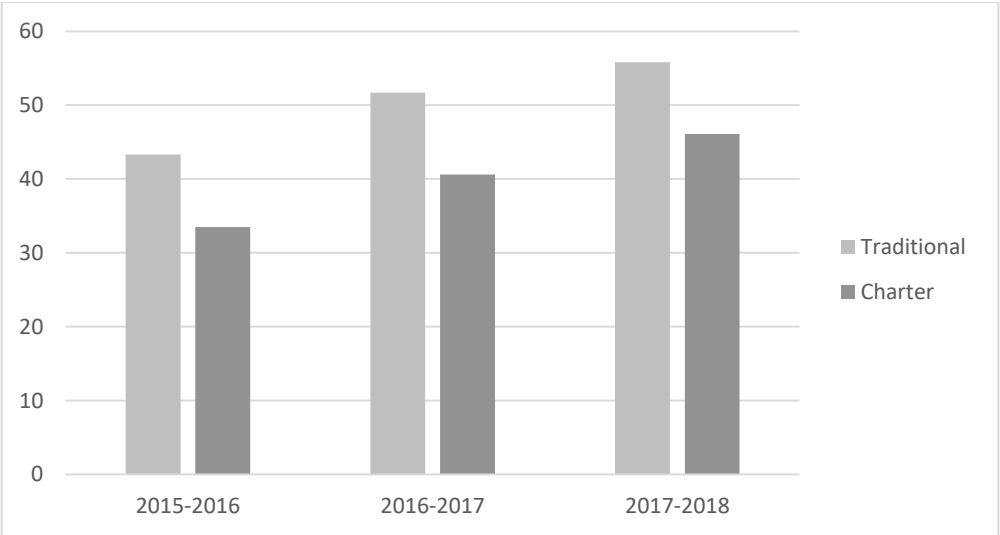
Table 2. Descriptive statistics for the STAAR grade 4 Mathematics meet grade level standards by school type for the 2015-2016, 2016-2017, and 2017-2018 school years

	Did Not Meet Standard		Met Standard	
School Year and School Type	*n*	%	*n*	%
2015-2016				
Traditional	114,884	56.7	87,680	43.3
Charter	6,440	66.5	3,249	33.5
2016-2017				
Traditional	100,130	48.3	107,182	51.7
Charter	6,211	59.4	4,252	40.6
2017-2018				
Traditional	78,712	44.2	99,348	55.8
Charter	5,403	53.9	4,630	46.1

Regarding the 2016-2017 school year, a statistically significant difference was observed, $\chi^2(1) = 487.83$, $p < .001$, Cramer's V = .05, a small effect size [31]. Similar to the 2015-2016 school year, a statistically significantly higher percentage, 11 percentage points higher, of Grade 4 students who were enrolled in traditional elementary schools met the Meets Grade Level performance standard than Grade 4 students who were enrolled in charter elementary schools. Delineated in Table 2 are the descriptive statistics for this analysis.

Concerning the 2017-2018 school year, a statistically significant result was revealed: $\chi^2(1) = 357.55$, $p < .001$; Cramer's V = .04, a small effect size [31]. Compared to the first two school years, a statistically significantly higher percentage, 9.7 percentage points higher, of Grade 4 students who were enrolled in traditional elementary schools met the Meets Grade Level performance standard than Grade 4 students who were enrolled in charter elementary schools. Revealed in Table 2 are the descriptive statistics for this analysis. Results were consistent for the 2015-2016, 2016-2017, and 2017-2018 school years. Grade 4 students enrolled in traditional schools met the Meets Grade Level performance indicator by approximately 10 percentage points more than those enrolled in charter schools. These results are depicted in Figure 2.

Figure 2. Percentages of students who met the grade level standard on the grade 4 STAAR mathematics exam for the 2015-2016 through the 2017-2018 school year by school type



Master's Grade Level Results

For the 2015-2016 school year, a statistically significant difference was observed, $\chi^2(1) = 250.77$, $p < .001$, Cramer's V = .03, a small effect size (Cohen, 1988). A statistically significantly higher percentage, 7.1 percentage points higher, of Grade 4 students who were enrolled in traditional elementary schools met the Master's Grade Level performance standard than Grade 4 students who were enrolled in charter elementary schools. Table 3 contains the descriptive statistics for this analysis.

Table 3. Descriptive statistics for the STAAR grade 4 mathematics masters grade level standard by school type for the 2015-2016, 2016-2017, and 2017-2018 school years

	Did Not Meet Standard		Met Standard	
School Year and School Type	*n*	%	*n*	%
2015-2016				
Traditional	153,229	75.6	49,335	24.4
Charter	8,011	82.7	1,678	17.3
2016-2017				
Traditional	143,101	48.3	64,211	31
Charter	8,115	59.4	2,348	22.4
2017-2018				
Traditional	120,107	67.5	57,953	32.5
Charter	7,517	74.9	2,516	25.1

Concerning the 2016-2017 school year, a statistically significant difference was observed, $\chi^2(1) = 341.67$, $p < .001$, Cramer's V = .04, a small effect size. Similar to the 2015-2016 school year, a statistically significantly higher percentage, 8.6 percentage points higher, of Grade 4 students who were enrolled in traditional elementary schools met the Master's Grade Level performance standard than Grade 4 students who were enrolled in charter elementary schools. Delineated in Table 3 are the descriptive statistics for this analysis.

Regarding the 2017-2018 school year, a statistically significant result was revealed: $\chi^2(1) = 242.94$, $p < .001$; Cramer's V = .04, a small effect size. Congruent with the first two school years, a statistically significantly higher percentage, 7.4 percentage points higher, of Grade 4 students who were enrolled in traditional elementary schools met the Master Grade Level performance standard than Grade 4 students who were enrolled in charter elementary schools. Revealed in Table 3 are the descriptive statistics for this analysis. In the 2015-2016 and 2017-2018 school years, Grade 4 students enrolled in traditional schools met the Master Grade Level standard by over seven percentage points more than those enrolled in charter schools. For the 2016-2017 school years, Grade 4 students enrolled in traditional schools met the standard by almost nine percentage points more than those enrolled in charter schools. These results are shown in Figure 3.

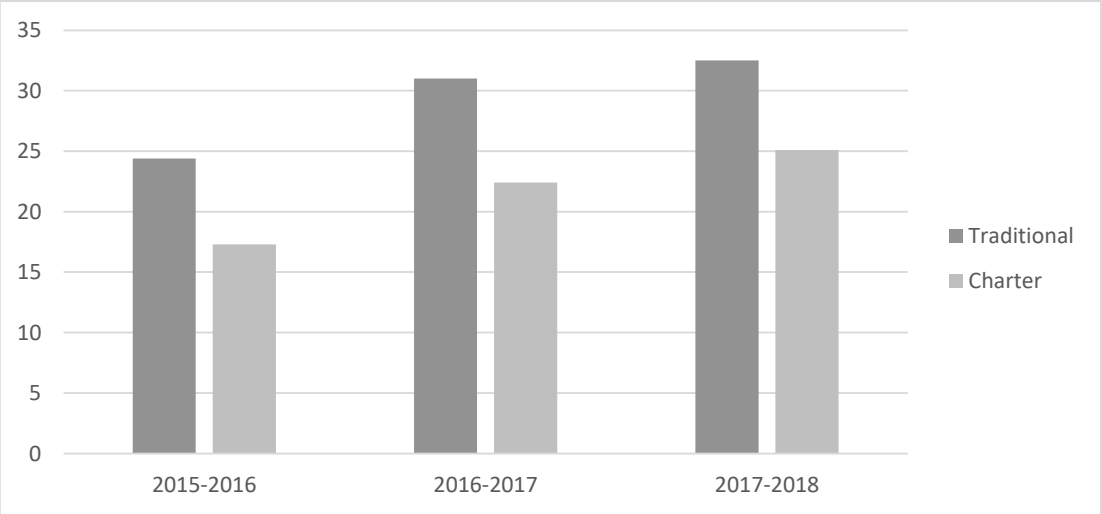


Figure 3. Percentages of students who met the master's grade level standard on the grade 4 STAAR mathematics exam for the 2015-2016 through the 2017-2018 school year by school type

4.2. Results for the performance standards over time by school type

Regarding trends in Grade 4 Mathematics Performance standards from the 2015-2016 through the 2017-2018 school years, Grade 4 students enrolled in traditional schools outperformed those enrolled in charter schools. Regarding the Approaches Grade Level indicator, Grade 4 students enrolled in traditional schools met this indicator on average 7.8 percentage points more than those enrolled in charter schools. With respect to the Meets Grade Level performance indicator, almost 10 percentage points more Grade 4 students enrolled in traditional schools met this indicator than those enrolled in charter schools. Regarding the Master's Grade Level scores, an average of 7.7 percentage points more Grade 4 students enrolled in traditional schools met this indicator than those enrolled in charter schools.

5. Discussion

Analyzed in this investigation was the extent to which differences were present in the mathematics performance of Texas Grade 4 students who were enrolled in traditional elementary schools and Grade 4 students who were enrolled in charter elementary schools. Three years of Texas Statewide data on the three Grade 4 STAAR Mathematics Performance Indicators were examined for students enrolled in either a charter school or a traditional elementary school.

Statistically significant results were present in all three school years. For each of the three STAAR Mathematics Performance Indicators (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level), in all three years analyzed, Grade 4 students who were enrolled in traditional elementary schools had statistically significantly better performance than Grade 4 students who were enrolled in charter schools. The gaps were consistent across the three school years and ranged from 6.4 percentage points to 11.1 percentage points. The STAAR Mathematics Performance Indicator with the largest gap between Grade 4 students enrolled in traditional schools and those enrolled in charter schools was the Meets Grade Level indicator, with each year yielding approximately a 10 percentage-point difference.

To be considered grade-level, students must meet the standard for Meets Grade Level or Master Grade Level. For each of the three years of data, Grade 4 students enrolled in traditional schools met the standards of Meets Grade Level and Master Grade Level at higher rates than those enrolled in charter schools. A higher percentage of Grade 4 students in traditional schools were at or above grade level than were those enrolled in charter schools across all three school years. For the 2015-2016 and 2017-2018 school years, the difference between traditional and charter school performance in these two Performance Indicators was about 17 percentage points. In the 2016-2017 school year, Grade 4 students in traditional schools outperformed those in charter schools by almost 20 percentage points in the Meets Grade Level and Master Grade Level categories.

Notably, the percentage of Grade 4 students who met the Approaches Grade Level performance indicator increased in both traditional and charter schools. The percentage of Grade 4 students enrolled in either traditional or charter schools who did not meet the standard for the Approaches Grade Level performance indicator decreased in each of the analyzed school years. This trend was congruent for all three performance indicators for the 2015-2016, 2016-2017, and 2017-2018 school years.

In this investigation, a higher percentage of Grade 4 students enrolled in traditional elementary schools met STAAR Mathematics performance indicators than did those enrolled in charter schools. Charter schools have had an accelerated growth, 250% within the last 10 years (Texas Education Agency, 2016b), and school reformers are advocating for the development of charter schools. Yet, the efficacy of charter schools has not been established.

5.1. Connections to existing literature

Several researchers have previously examined the extent to which charter school students and traditional school students differ in their academic performance on Texas state-mandated assessments [21][22]. In this 3-year Statewide investigation, a higher percentage of Grade 4 students enrolled in traditional elementary schools met the STAAR Mathematics Performance Standards (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) than did those enrolled in charter schools. The findings delineated herein were consistent with Penning and Slate [21], who documented that students enrolled in charter schools did not perform better than those enrolled in traditional public schools.

These results were also consistent with Escalante and Slate [22], in which Grade 3 students enrolled in traditional public schools had statistically significantly higher reading scores than those enrolled in charter schools. Escalante and Slate [22] found that Grade 3 students enrolled in traditional elementary schools had higher average reading pass rates than their peers enrolled in charter elementary schools.

5.2. Implications for policy and practice

Several implications for policy and practice can be drawn from the results of this multiyear, statewide investigation. Regarding implications, educational leaders should focus their efforts on providing more education on the effectiveness of charter schools. Additionally, policymakers should analyze the results of this educational research study before making decisions regarding academic and financial support to charter school systems. Charter schools not fulfilling the purpose of Texas Education Code 12.001 to “improve student learning” should undergo a mandatory partnership with the School Improvement Team at the Texas Education Agency or a local Education Service Center and participate fully in Texas Instructional Leadership practices. Texas Instructional Leadership practices

focus on observation and feedback, culture and routines, data-driven instruction, lesson plans, and formative assessment. These tools are what the Texas Education Agency recommends leaders focus on to improve student achievement and produce effective schools [19][28][29].

Regarding implications for practice, to help parents in their decision-making about where to enroll their children, all schools should be required to provide information on their academic rating at registration. If charter school students are not performing at least as well as local traditional school students, this information should be released to all parents of those students. If parents are given a choice where to send their students, complete transparency in academic achievement should be required.

5.3. Recommendations for future research

Given the results of this multiyear investigation, several recommendations for future research can be made. This study used data from only Grade 4 students enrolled in either a traditional elementary school or a charter elementary school in Texas. The degree to which findings obtained herein would be generalizable to schools in other states is not known. Moreover, the extent to which these findings would be generalizable to students in other grade levels is unknown. Accordingly, researchers are encouraged to examine students' mathematics performance in traditional and charter schools in other states and at other grade levels. Another recommendation is for researchers to analyze mathematics performance by student demographic characteristics. That is, in this investigation, the performance of all students was addressed. Because mathematics gaps have been documented in the literature for students in poverty and for students of color, researchers are encouraged to examine mathematics performance by student demographic characteristics. Finally, researchers are encouraged to conduct longitudinal studies that track students' progress throughout their enrolment in both traditional and charter schools.

6. Conclusion

The purpose of this investigation was to determine the extent to which differences were present in the mathematics achievement of Grade 4 students in Texas as a function of school type (i.e., charter schools and traditional schools). Three school years of archival data from the Texas Education Agency Public Education Information Management System were analyzed. In each school year, Grade 4 students enrolled in traditional elementary schools had a statistically significantly higher percentage of students who met each performance indicator (i.e., Approaches Grade Level, Meets Grade Level, and Masters Grade Level) than did Grade 4 students enrolled in charter elementary schools. As such, no evidence was present that students enrolled in charter schools have higher mathematics achievement than students enrolled in traditional schools.

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