

Charter School Performance in Ohio

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Table of Contents

Introduction	7
Study Approach	9
Ohio Charter School Demographics	12
Overall Charter School Impact	15
Charter School Impact with 2009 Cohort.....	18
Charter School Impact by Growth Period.....	19
Charter School Impact by Location.....	19
Charter School Impact by School Level	21
Charter School Impact by Students' Years of Enrollment.....	22
Charter School Impact by Race/Ethnicity	23
Charter School Impact with Students in Poverty.....	28
Charter School Impact with Race/Ethnicity and Poverty	29
Charter School Impact with Special Education Students	33
Charter School Impact with English Language Learners	35
Charter School Impact by Student's Starting Decile.....	37
School-level Analysis	41
Impact of Charter Management Organizations	46
Authorizer Analysis.....	50
Synthesis and Conclusions	59
Appendix	66

Table of Figures

Figure 1: CREDO Virtual Control Record Methodology	10
Figure 2: Opened and Closed Charter Schools, 2007-2012	12
Figure 3: Average Learning Gains in Ohio Charter Schools, 2008-2013	16
Compared to Gains for VCR Students in Each Charter Schools' Feeder TPS.....	16
Figure 4: Original and Updated Impacts with 2009 Cohort.....	18
Figure 5: Impact by Growth Period, 2008-2013	19
Figure 6: Impact by School Location.....	20
Figure 7: Impact by School Level	21
Figure 8: Impact by Students' Years of Enrollment	23
Figure 9: Learning Gains of Black Students Benchmarked Against TPS White Student Learning Gains	24
Figure 9a: Relative Learning Gains for Black Charter School Students Benchmarked Against their TPS Black Peers	25
Figure 10: Learning Gains of Hispanic Students Benchmarked Against TPS White Student Learning Gains	26
Figure 10a: Relative Learning Gains for Hispanic Charter School Students Benchmarked Against their TPS Hispanic Peers	27
Figure 11: Learning Gains of Students in Poverty Benchmarked Against TPS White Student Learning Gains	28
Figure 11a: Relative Learning Gains for Charter School Students in Poverty Benchmarked Against their TPS Peers in Poverty	29
Figure 12: Learning Gains of Black Students in Poverty Benchmarked Against TPS White Non-Poverty Student Learning Gains.....	30
Figure 12a: Relative Learning Gains for Black Charter School Students in Poverty Benchmarked Against their TPS Black Poverty Peers.....	31
Figure 13: Learning Gains of Hispanic Students in Poverty Benchmarked Against TPS White Non-Poverty Student Learning Gains.....	32
Figure 13a: Relative Learning Gains for Hispanic Charter School Students in Poverty Benchmarked Against their TPS Hispanic Poverty Peers.....	33
Figure 14: Learning Gains of Special Education Students Benchmarked Against TPS Non-Special Education Student Learning Gains.....	34

Figure 14a: Learning Gains of Special Education Charter School Students Benchmarked Against TPS Special Education Student Learning Gains	35
Figure 15: Learning Gains of ELL Students Benchmarked Against TPS Non-ELL Student Learning Gains	36
Figure 15a: Learning Gains of ELL Charter School Students Benchmarked Against TPS ELL Student Learning Gains	37
Figure 16: TPS and Charter School Student Learning Gains by Students' Starting Decile Benchmarked by TPS Students in the 5 th Decile– Reading	38
Figure 16a: Charter School Student Learning Gains by Students' Starting Decile Benchmarked against TPS Student Learning Gain – Reading.....	38
Figure 17: TPS and Charter School Student Learning Gains by Students' Starting Decile Benchmarked by TPS Students in the 5 th Decile – Math	39
Figure 17a: Charter School Student Learning Gains by Students' Starting Decile Benchmarked against TPS Student Learning Gain – Math	39
Figure 18: Average Student Learning Gains of Charter Management Organizations and Non-Network Charter Schools Benchmarked Against the Statewide Average TPS Student Learning Gain	47
Figure 18a: Comparison of Charter CMOs Learning Gains Benchmarked Against Charter Non-CMOs Learning Gains	48
Figure 19: CMO and Non-CMO Student Learning Gains by School Level Benchmarked Against TPS Learning Gains by School Level	49
Figure 19a: Comparison of Student learning Gains in CMOs by School-Level Benchmarked Against Non-CMO Charter School Learning Gains	50

Table of Tables

Table 1: Demographic Comparison of Students in TPS, Feeders and Charters	13
Table 2: Demographic Composition of Charter Students in the Study.....	14
Table 3: Transformation of Average Learning Gains.....	17
Table 4: Performance of Charter Schools Compared to Their Local Schools in Ohio	42
Table 5: Performance of Charter Schools Compared to Their Local Schools by City	43
Table 6: Reading Growth and Achievement	44
Table 7: Math Growth and Achievement.....	45
Table 8: Impact of Largest Authorizers 2009-2012	53
Table 9: Portfolios of Largest Authorizers by Location	54
Table 10: Impact of Authorizer Size and Location on Student Learning	55
Table 11: Impact of Type and Size of Authorizer	58
Table 12: Summary of Results	64
Table 13: Summary of Statistically Significant Findings by City	65

Introduction

Across the country, charter schools occupy a growing position in the public education landscape. Heated debate has accompanied their existence since their start in Minnesota over two decades ago. Similar debate has occurred in Ohio as well, with charter advocates extolling such benefits of the sector as expanding parental choice and introducing market-based competition to education. The debate could be aided with hard evidence about charter schools impact on student outcomes. This report contributes to the discussion by providing independent examination of charter students' performance in Ohio for six years of schooling, beginning with the 2007-2008 school year and concluding in 2012-2013. This report updates an earlier CREDO analysis that covered the period from 2004-2005 to 2007-2008; thus one academic year appears in both studies.

With the cooperation of the Ohio Department of Education, CREDO obtained the historical sets of student-level administrative records. The support of Ohio DOE staff was critical to CREDO's understanding of the character and quality of the data we received. However, it bears mention that the entirety of interactions with the Department dealt with technical issues related to the data. CREDO has developed the findings and conclusions independently.

This report provides an in-depth examination of the results for charter schools in Ohio. It is also an update to CREDO's first analysis of the performance of Ohio's charter schools, which can be found at our website.¹ This report has three main benefits. First, it provides an updated rigorous and independent view of the performance of the state's charter schools. Second, the study design is consistent with CREDO's reports on charter school performance in other locations, making the results amenable to benchmarking against those for the nation and in other states. Third, the study includes a section on charter performance in four metropolitan areas where much attention has focused: Cincinnati, Cleveland, Columbus and Dayton.

The analysis presented here takes two forms. We first present the findings about the effects of charter schools on student academic performance. These results are expressed in terms of the academic progress that a typical student in Ohio would realize from a year of enrollment in a charter school. To help the non-technical reader grasp the findings, we transcribe the scientific estimates into days of learning based on the foundation of a 180-day school year. The second set of findings is presented at the school level. Because schools are the instruments on which legislation and public policy works, it is important to understand the range of

¹ CREDO. *Charter School Performance in Ohio* (2009). <http://credo.stanford.edu>

performance for the schools. These findings look at the performance of students by school and present school average results.

Compared to the educational gains that charter students would have had in a traditional public school (TPS), the analysis shows on average that students in Ohio charter schools perform worse in both reading and mathematics. The impact is statistically significant: thinking of a 180-day school year as "one year of learning", **an average Ohio charter student would have completed 14 fewer days of learning in reading and 36 fewer days in math.** There are positive notes found in the analysis. For example, **students in urban charter schools in Ohio post superior yearly gains compared to the statewide average student performance;** this finding is unique among the numerous state studies that CREDO has completed. Another positive result is the **learning gain superiority for students in poverty and especially for black charter students in poverty:** their progress over a year's time outpaces that of equivalent TPS students.

At the school level, 19 percent of the charter schools have significantly more positive learning gains than their TPS counterparts in reading, while 18 percent of charter schools have significantly lower learning gains. In math, 27 percent of the charter schools studied outperform their TPS peers and 23 percent perform worse. The impact of charter schools in Columbus, Cincinnati, Cleveland and Dayton are also analyzed separately. These cities were selected because they are regularly identified as districts with long-standing performance challenges and that provide a sufficient number of charter schools to support separate analyses. As well, these schools are somewhat distinct in that they are expected to provide results that improve on the prevailing performance of district schools. Compared to the educational gains that charter students would have had in TPS, the analysis shows on average that students in **Cleveland charter schools have significantly larger learning gains in both reading and mathematics.** At the school level, 33 percent of the charter schools have significantly more positive learning gains than their TPS counterparts in reading and math, while only 6 percent of charter schools have significantly lower learning gains in Cleveland. Educational gains for charter students in Dayton are similar to students in traditional public schools. Cincinnati and Columbus charter students do not differ from traditional public students in reading, but perform significantly worse in math.

Study Approach

This study of charter schools in Ohio focuses on the academic progress of charter-enrolled students. Whatever else charter schools may provide their students, their contributions to their students' readiness for secondary education, high school graduation, and post-secondary life remains of paramount importance. Indeed, if charter schools do not succeed in forging strong academic futures for their students, other outcomes of interest, such as character development or non-cognitive skills, cannot compensate. Furthermore, current data limitations prevent the inclusion of non-academic outcomes in this analysis.

This statewide analysis uses the Virtual Control Record (VCR) methodology that has been used in previous CREDO publications.² The approach is a quasi-experimental study design with matched student records that are followed over time. The current analysis begins with the general question of whether in the aggregate students in Ohio charter schools outperform their TPS counterparts. This general question is then extended to consider whether the observed charter school performance is consistent when the charter school population is disaggregated along a number of dimensions, such as race/ethnicity, geographic location and so on. Answers to all these questions require that we ensure that the contribution of the schools – either the charter schools or the TPS schools – is isolated from other potentially confounding influences. For this reason, these analyses include an array of other variables whose purpose is to prevent the estimate of charter schooling to be tainted by other effects. In its most basic form, the analysis included controls for student characteristics: standardized starting score, race/ethnicity, special education status, federal lunch program participation (as a proxy for poverty), English proficiency, grade level, and repeating a grade.

To create a reliable comparison group for our study, we attempted to build a VCR for each charter school student. A VCR is a synthesis of the actual academic experience of students who are identical to the charter school students, except for the fact that they attend a TPS that the charter school students would have attended if not enrolled in their charter school. We refer to the VCR as a 'virtual twin' because it takes the experience of multiple 'twins' and creates a single synthesis of their academic performance to use as the counterfactual to the charter school student's performance.

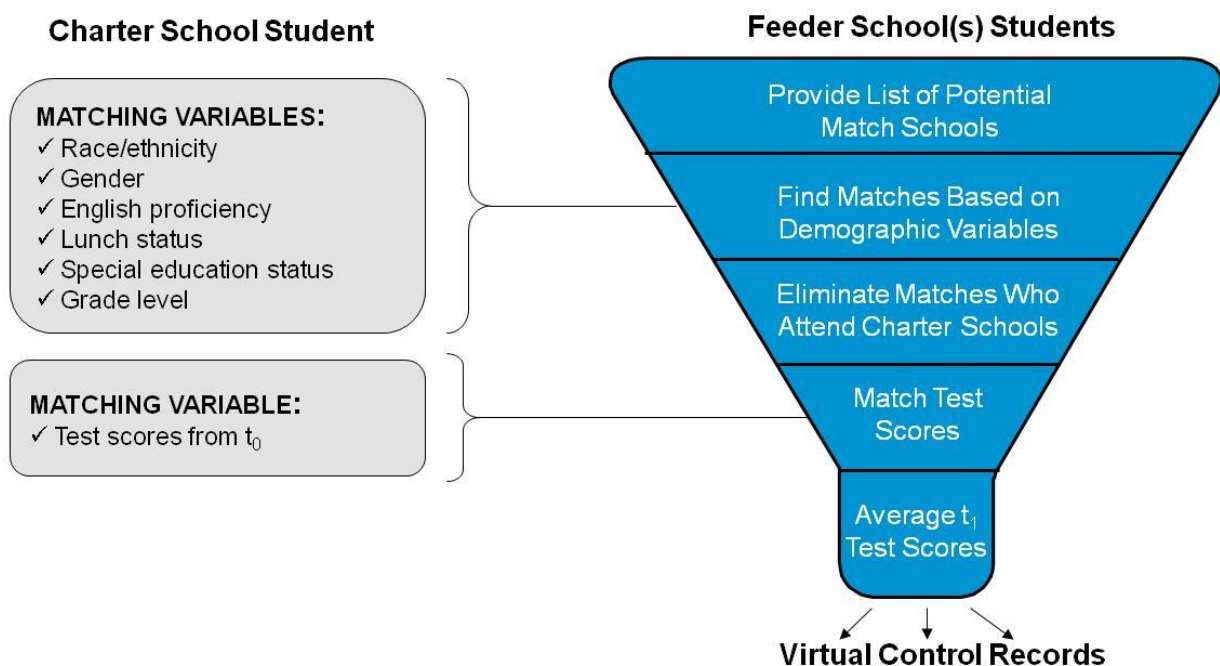
² CREDO. *Multiple Choice: Charter School Performance in 16 States* (2009). Davis, Devora H. and Margaret E. Raymond. Choices for Studying Choice: Assessing Charter School Effectiveness Using Two Quasi-experimental Methods. *Economics of Education Review* 31, no. 2 (2012): 225-236. For the interested reader, links to these reports are available at <http://credo.stanford.edu>.

Our approach is displayed in Figure 1. We identify all the traditional public schools whose students transfer to a given charter school; each of these schools is a “feeder school.” Once a TPS qualifies as a feeder school, all the students in the school become potential matches for a student in a particular charter school. All the student records from all the feeder schools are pooled – this becomes the source of records for creating the virtual match. Using the records of the students in those schools in the year prior to the test year of interest (t_0), CREDO selects all of the available TPS students that match each charter school student.

Match factors include:

- Grade Level
- Gender
- Race/Ethnicity
- Free or Reduced Price Lunch Status
- English Language Learner Status
- Special Education Status
- Prior test score on state achievement tests

Figure 1: CREDO Virtual Control Record Methodology



At the point of selection as a VCR-eligible TPS student, all candidates are identical to the individual charter school student on all observable characteristics, including prior academic achievement. The focus then moves to the subsequent year, t_1 . The scores from this test year of interest (t_1) for as many as seven VCR-eligible TPS

students are then averaged and a Virtual Control Record is produced. The VCR produces a score for the test year of interest that corresponds to the expected gains a charter student would have realized if he or she had attended one of the traditional public schools that would have enrolled the charter school's students. The VCR provides the counterfactual "control" experience for this analysis.

For the purposes of this report, the impact of charter schools on student academic performance is estimated in terms of academic growth from one school year to the next. This increment of academic progress is referred to by policy makers and researchers as a "growth score" or "learning gains" or "gain scores." Using statistical analysis, it is possible to isolate the contributions of schools from other social or programmatic influences on a student's growth. Thus, all the findings that follow are measured as the average one-year growth of charter schools, relative to the VCR-based comparison.

With six years of student records in Ohio, it is possible to create five periods of academic growth. One growth period needs a "starting score", (i.e., the achievement test result from the spring of one year) and a "subsequent score," (i.e., the test score from the following spring) to create a growth score. To simplify the presentation of results, each growth period is referred to by the year in which the second spring test score is obtained. For example, the growth period denoted "2010" covers academic growth that occurred between the end of the 2008-2009 and the end of the 2009-2010 school years. Similarly, the time period denoted "2011" corresponds to the year of growth between the 2009-2010 and 2010-2011 school years.

With six years of data, and seven tested grades (3rd - 8th, 10th), there are 42 different sets of data each for Reading and Math; each subject-grade-year group of scores has slightly different mid-point averages and distributions. The analysis is aided by transforming the test scores for all these separate tests into a common measurement. All test scores have been converted to "bell curve" standardized scores so that year-to-year computations of growth can be made.³

When scores are thus standardized into z-scores, every student is placed relative to his peers in his own state. A z-score of zero, for example, denotes a student at the

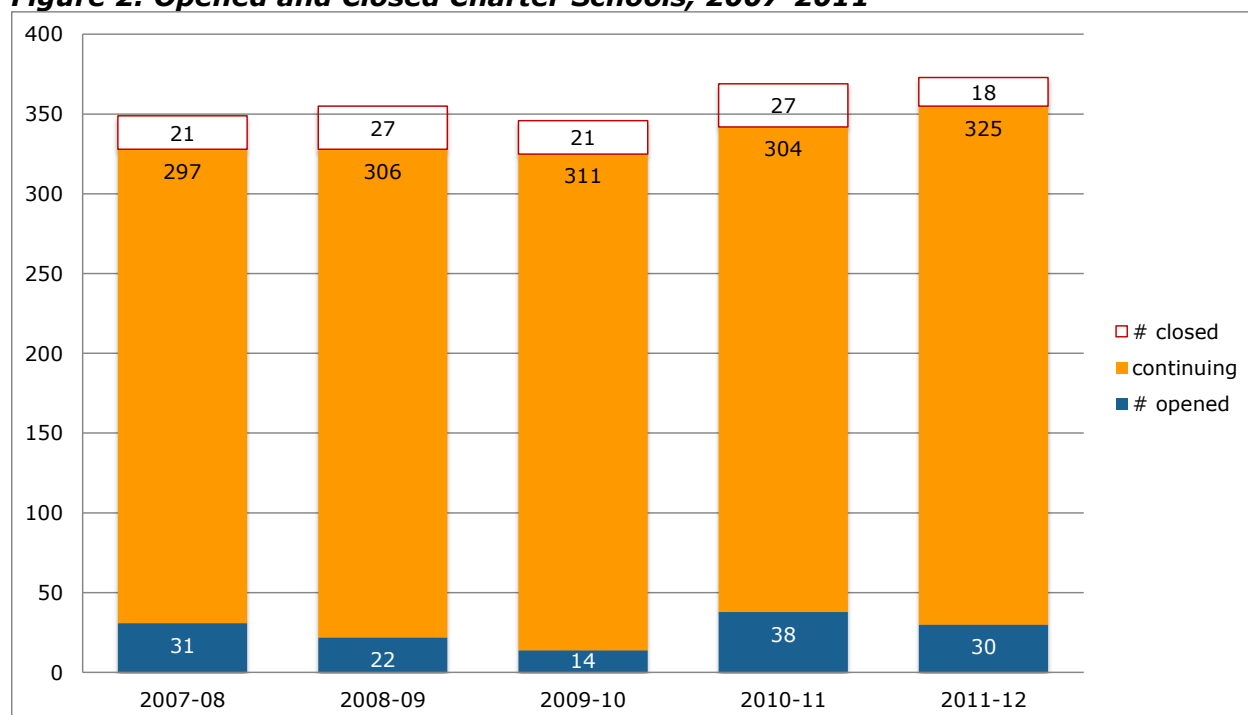
³ For each subject-grade-year set of scores, scores are centered around a standardized midpoint of zero, which corresponds to the actual average score of the test before transformation. Then each score of the original test is recast as a measure of deviation around that new score of zero, so that scores that fell below the original average score are expressed as negative numbers and those that were larger are given positive values. These new values are assigned so that in every subject-grade-year test, 68 percent of the former scores fall within a given distance, known as the standard deviation.

50th percentile in that state, while a z-score one standard deviation above that equates to the 84th percentile. Students who maintain their relative place from year to year would have a growth score of zero, while students who make larger gains relative to their peers will have positive growth scores. Conversely, students who make smaller academic gains than their peers will have negative growth scores in that year.

Ohio Charter School Demographics

The Ohio charter school sector has remained relatively stable across the study period. Figure 2 below notes the new, continuing, and closed charter schools from the fall of 2007 to the fall of 2011.

Figure 2: Opened and Closed Charter Schools, 2007-2011



According to the Ohio Department of Education, there were 355 charter schools open in Ohio in the 2011-12 school year⁴. Because charter schools are able to choose their location, the demographics of the charter sector may not mirror that of the TPS sector as a whole. Further, charter schools create a degree of sorting through their offer of different academic programs and alternate school models. In addition, parents and students who choose to attend charter schools select schools for a variety of reasons, such as location, school safety, small school size, academic

⁴ Note there is a slight difference between the NCES data and the charter school data located on the Ohio Department of Education website

focus, or special interest programs. The cumulative result of all these forces is that the student populations at charters and their TPS feeders may differ. Table 1 below compares the student populations of all Ohio’s traditional public schools, the charters’ feeder schools, and the charter schools themselves.

Table 1: Demographic Comparison of Students in TPS, Feeders and Charters

	TPS	Feeders	Charters
Number of schools	3360	1456	355
Average enrollment per school	486	505	302
Total number of students enrolled	1,631,772	735,287	107,089
Students in Poverty	45%	55%	74%
English Language Learners	2%	3%	2%
Special Education Students	15%	15%	16%
White Students	76%	68%	44%
Black Students	14%	21%	45%
Hispanic Students	4%	5%	5%
Asian/Pacific Islander Students	2%	2%	1%
Native American Students	0%	0%	0%

Table 1 above shows that charter schools have more students in poverty, more Black students and significantly fewer White students than traditional public schools. The student profile for the entire charter school community does not reveal any advantages in the stock of students attending the schools; as a prima facie test of selectivity in charter schools, the profiles refute the suggestion that charter schools in Ohio "cream skim" their students. The feeder school populations would be expected to more closely align demographically with charter schools and they do, but even here there are differences. Charter schools enroll greater shares of Black students and students in poverty than feeder schools. Charter schools serve fewer White students than feeder schools.

There has been considerable attention paid to the share of students in charter schools who are receiving Special Education services or who are English Language Learners. As shown in Table 1, traditional public schools and charter schools serve roughly equal proportions of both Special Education students and English Language Learners. As Table 1 shows there are very few English Language Learners in the state of Ohio.

Table 2: Demographic Composition of Charter Students in the Study

Student Group	All Charter Students Tested		Matched Charter Students	
	Number	Percent	Number	Percent
Ohio Charter Students	67,820		52,648	
% Matched	52,648	78%		
Black Students	32,732	48%	25,779	49%
Hispanic Students	3,663	5%	1,682	3%
White Students	27,772	41%	23,703	45%
Students in Poverty	48,619	72%	38,071	72%
Special Education Students	8,877	13%	4,534	9%
English Language Learners	1,014	1%	151	0%
Grade Repeating Students	2,543	4%	399	1%

NOTE: The appendix includes additional descriptive demographics.

For this analysis, a total of 67,820 charter school students (with 96,464 observations across 5 growth periods) are followed for as many years as data are available.⁵ The students are drawn from Grades 3 – 8, since these are the continuous grades that are covered by the state achievement testing program for reading and math. Students are also drawn from 10th grade if an 8th grade record is present to enable calculation of student growth⁶. An identical number of virtual comparison records are included in the analysis. In Ohio, it was possible to create virtual matches for 79 percent of the tested charter school students in math and 78 percent in reading. This proportion assures that the results reported here can be

A Roadmap to the Graphics

The graphics in this report have a common format.

Each graph presents the average performance of charter students relative to their **pertinent comparison student**. The reference group differs depending on the specific comparison. Where a graph compares student subgroup performance, the pertinent comparison student is the same for both subgroups. Each graph is labeled with the pertinent comparison group for clarity.

The **height** of the bars in each graph reflects the magnitude of difference between traditional public school and charter school performance over the period studied.

Stars are used to reflect the level of statistical significance of the difference between the group represented in the bar and its comparison group; the absence of stars means that the schooling effect is not statistically different from zero.

Comparisons of the **performance of similar student subgroups** contain an additional test of the absolute difference between the charter school subgroup and their comparison VCRs this information is provided in a graph labeled "a".

⁵ Schools that have opened recently or that have only recently begun serving tested grades will not have five growth periods of experience to include.

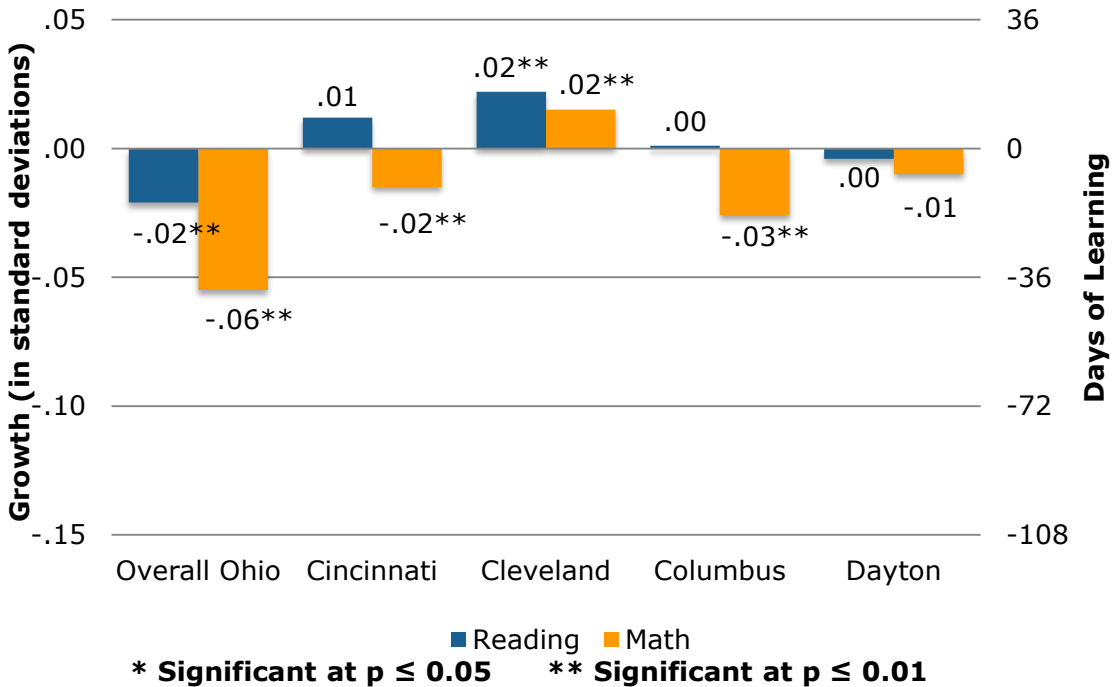
⁶ Growth for 10th grade students is calculated by subtracting their 8th grade z-score from their 10th grade z-score and dividing by two.

considered indicative of the overall performance of charter schools in the state. The total number of observations is large enough to be confident that the tests of effect detect real differences between charter school and TPS student performance at the statistically acceptable standard of $p < .05$. However, there is one sub-population group featured in the report where the results should be interpreted cautiously: the ELL population is very small in the state of Ohio. The small number of ELL students reduces our ability to detect differences between charter ELL students and their virtual twins. Additionally, it was difficult to match ELL students (match rate of 15%). This was due, in large part, to the low number of ELL students in the state. The low match rate decreases our confidence in the ability to generalize the ELL results to the ELL population in Ohio.

Overall Charter School Impact

First, we examine whether charter schools differ overall from traditional public schools in how much their students learn, holding other factors constant. To answer this question, we average the pooled performance for all charter school students across all the growth periods and compare it with the same pooled performance of the VCRs. The result is a measure of the typical learning of charter school students in one year's time compared to their VCR peers from the feeder schools nearby. The results appear in Figure 3. On average, students in Ohio's traditional public schools learned significantly more than students in charter schools in both reading and mathematics.

Figure 3: Average Learning Gains in Ohio Charter Schools, 2008-2013 Compared to Gains for VCR Students in Each Charter Schools' Feeder TPS



When we investigate the learning impacts of Cincinnati, Cleveland, Columbus, and Dayton charter schools separately, we find that only charter students in Cleveland outperform their TPS counterparts. Learning gains in both reading and math in Dayton do not differ significantly from TPS students. For charter students in Cincinnati and Columbus learning gains do not differ from TPS students in reading, but charter students' learning gains in math are significantly less.

The data are analyzed in units of standard deviations of growth so that the results will be statistically correct. Unfortunately, these units do not have much meaning for the average reader. Transforming the results into more accessible units is challenging and can be done only imprecisely. We consider the average learning gain from year to year for all students in the state, and arbitrarily set that value to 180 days of learning, the typical length of a school year. We then transform the standard deviation units from the analysis into days of learning, so that we can describe whether the charter school student has learning gains as though they had attended x days fewer or more, depending on the results. Therefore, Table 3

below, which presents a translation of various outcomes, should be interpreted cautiously.⁷

Table 3: Transformation of Average Learning Gains

Growth (in standard deviations)	Gain (in months of learning)
0.00	0.0
0.01	7.2
0.05	36.0
0.10	72.0
0.15	108.0
0.20	144.0
0.25	180.0
0.30	216.0

Using the results from Figure 3 and the transformations from Table 3, per year of schooling, we can see that, on average, charter students in Ohio fell behind their TPS counterparts by significant amounts. The disadvantage for charter students is 14 fewer days of learning in a school year in reading and 43 fewer days of learning in math for the same time period. For Cincinnati, the loss equates to 14 days of learning for math; in Columbus, the gap is about 22 days of learning in math. Cincinnati and Columbus charter students are on par in their learning for reading, as is the case for Dayton in both subjects. The learning advantage for charter students in Cleveland is 14 days in both reading and math.

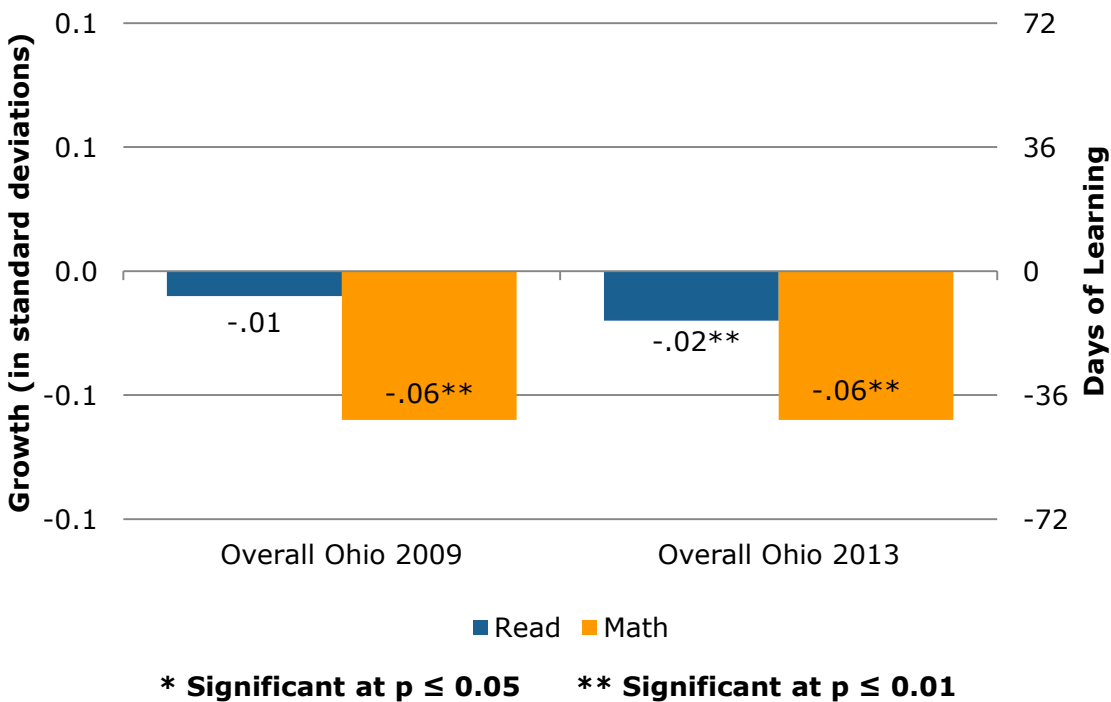
⁷ Hanushek, Eric A. and Steven G. Rivkin. Teacher quality. In *Handbook of the Economics of Education*, Vol. 2, ed. EA Hanushek, F Welch, (2006): 1051–1078. Amsterdam: North Holland.

Charter School Impact with 2009 Cohort

In 2009 CREDO released a national report on charter school performance. This section provides a comparison between the performance of charter schools in 2009 compared to the performance of charter schools released in the current report. As mentioned in the introduction the previous report and the current report have one academic year in common, 2007-2008. Figure 4 depicts academic achievement in Ohio in both reading and math for the 2009 report and the current report.

Academic achievement in Ohio is comparable between the two reports. Math achievement is the same in the current report as it was in the 2009 report. Charter students in Ohio are about 43 days of learning behind TPS students in math in both reports. In reading, charter students in the 2009 cohort did not differ significantly from TPS students; in the current report charter students have significantly lower achievement (about 14 days of learning) compared to TPS students.

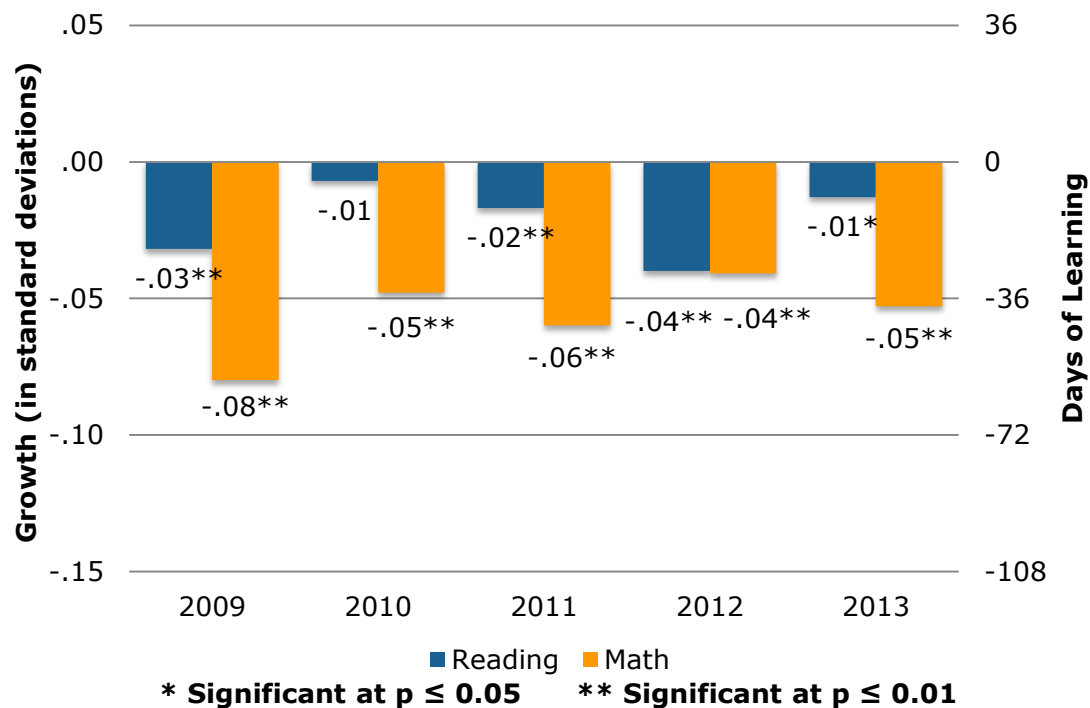
Figure 4: Original and Updated Impacts with 2009 Cohort



Charter School Impact by Growth Period

To determine whether performance remained consistent over time, the average statewide charter school effects were disaggregated into the five growth periods that were covered by the analysis.

Figure 5: Impact by Growth Period, 2009-2013



In both reading and math, charter students in Ohio learned significantly less than their peers in TPS in all five periods analyzed⁸. Charter students lag further behind TPS students in math than in reading. The largest gap in math is about 58 days of learning between charter and TPS students in 2009. The largest gap in reading is found in 2012, where the difference between charter and TPS students is nearly 29 days of learning.

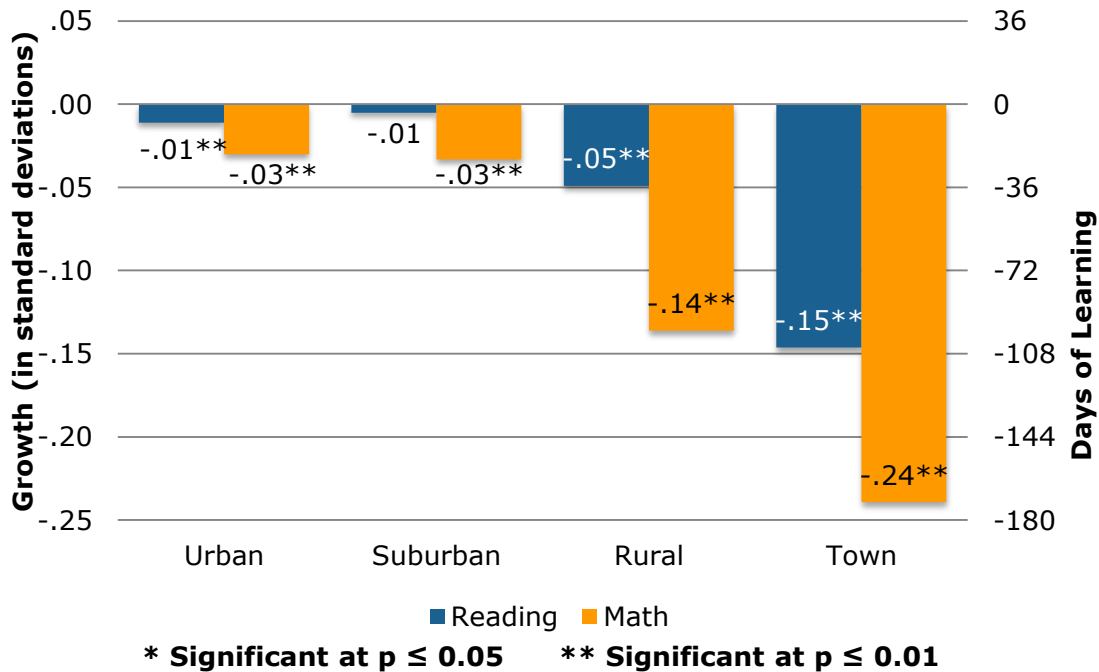
Charter School Impact by Location

Although charter schools in urban areas receive the bulk of media attention, charter schools can and do serve students in other locales. Differences in location may

⁸ With the exception of 2009 where reading is negative and not significant

relate to different average charter school effects. The results in Figure 5 represent the disaggregated impacts for urban, suburban, town, and rural charter schools.

Figure 6: Impact by School Location



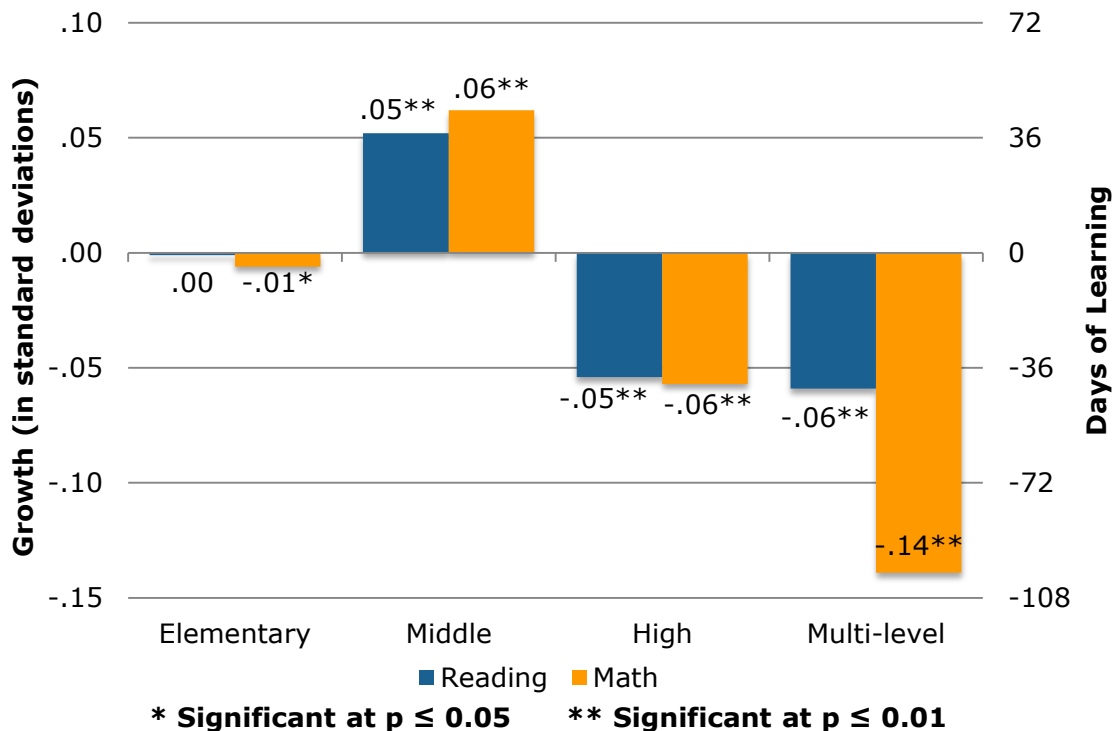
As shown in Figure 5 charter students in Ohio do not perform as well as students in traditional public schools across all locales. In this breakout, charter students are compared with their virtual twins who are drawn from the same locale; rural charter students are compared to their rural VCRs and so on. The greatest disparities between charter students and TPS students are found in towns and rural areas. Charter students in towns are about 173 days of learning behind their local TPS students in math and 108 days behind TPS students in reading. Charter students in rural areas are 36 days behind rural TPS students in reading and 101 days behind in math. The difference between both urban and suburban charter students and their TPS virtual peers equates to about 22 fewer days of learning in mathematics. Suburban charter students do not differ from TPS student in reading. Urban charter students have a seven day learning deficit compared to TPS students in urban areas.

Charter School Impact by School Level

The flexibility and autonomy enjoyed by charter schools allows them to choose which grade levels to serve, with many charter operators deciding to focus on particular ages while others seek to serve a full range of grades. For example, multi-level charter schools serve grade ranges larger than traditional elementary, middle or high schools, such as a combination of middle and high school grades. In the state of Ohio, schools are classified as multi-level if they do not serve 12th grade students. These school levels are tracked by the National Center for Education Statistics, which allows us to disaggregate charter school impacts for different grade spans.

This study examined the outcomes of students enrolled in elementary, middle, high, and multi-level schools. Growth scores for high schools display one half of the growth between 8th grade and 10th grade (an estimate of the growth between 9th and 10th grade), since the achievement testing program in Ohio only examines 10th graders in high school. The results appear in Figure 7 below.

Figure 7: Impact by School Level

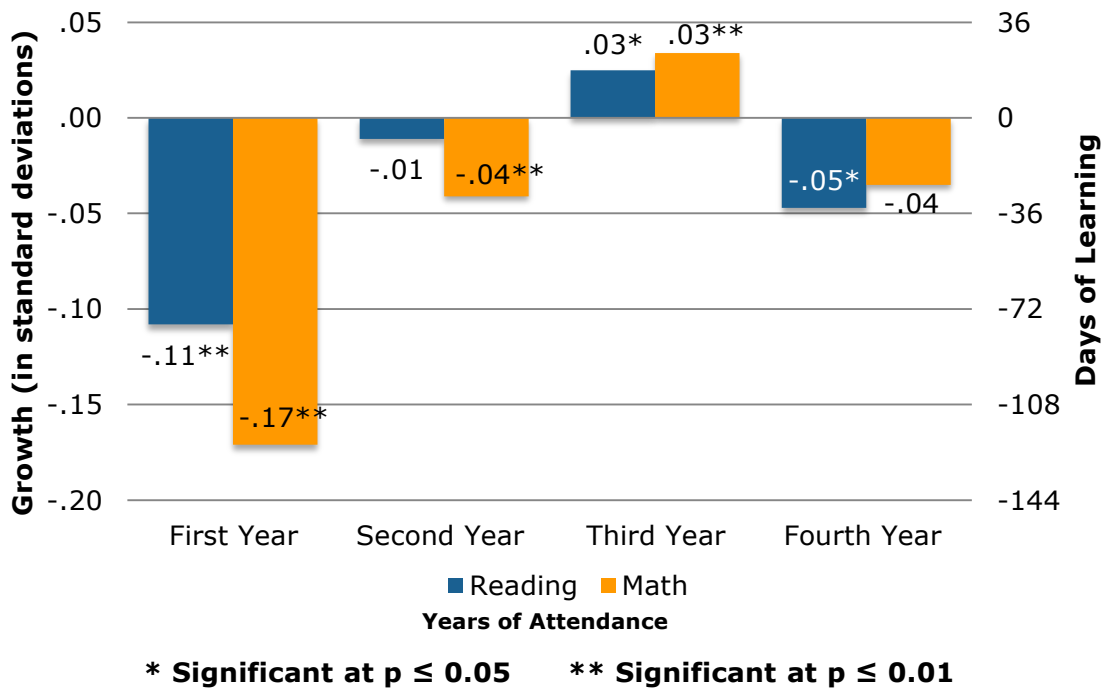


The results show that, on average, charter middle school students learn significantly more than their TPS virtual counterparts in both reading and math. This difference is 36 days of learning in reading and 43 days of learning in math. Charter students enrolled in high schools, by contrast, have the opposite result: they lag their TPS peers by 36 days of learning in reading and 43 days in math. Charter students in multi-level schools are the most disadvantaged compared to their TPS virtual peers, especially in math where they are about 100 days of learning behind TPS students. Their reading learning lags the TPS peers by 43 days.

Charter School Impact by Students' Years of Enrollment

Student academic growth in charter schools may change as students extend their enrollment in their school. To test this, students were grouped by the number of consecutive years they were enrolled in charter schools. In this scenario, the analysis is limited to the charter students who enrolled for the first time in a charter school between 2007-2008 and 2011-2012. Although this approach reduces the number of students included, it ensures that the available test results align with the years of enrollment. For this reason, the results of this analysis should not be contrasted with other findings in this report. This question examines whether the academic success of students who enroll in a charter school changes as they continue their enrollment in a charter school. The results are shown below in Figure 8.

Figure 8: Impact by Students' Years of Enrollment



The results suggest that new charter school students in Ohio see initial losses in math and reading compared to their counterparts in traditional public schools. The deficit in learning between TPS students and charter students is eliminated in reading and decreases markedly in math during the second year in charter schools. By the third year of enrollment charter schools students outperform their TPS virtual peers in math. By the fourth year Ohio charter students have fallen behind in reading and perform comparably to TPS students in math.

Charter School Impact by Race/Ethnicity

Attention in US public education to achievement differences by racial and ethnic backgrounds has increased since the passage of the *No Child Left Behind Act* in 2001. The effectiveness of charter schools across ethnic and racial groups is especially important given the proportion of charter schools that are focused on educating historically underserved students. The impact of charter schools on the academic gains of Black and Hispanic students is presented in Figure 9 below.

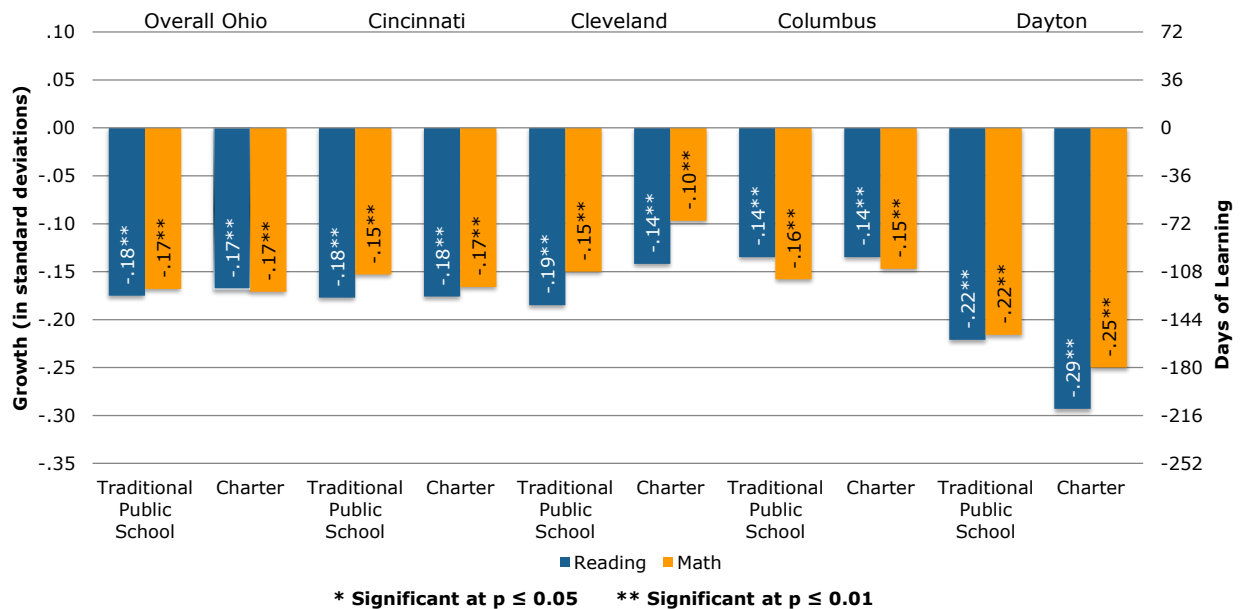
The graph displays two distinct comparisons, described below:

- The first comparison displays the performance of TPS students in the subgroups of interest relative to the "average White student in TPS;" in this comparison, the White student does not qualify for subsidized school meals,

Special Education services or English Language Learner support and is not repeating a grade. The values that appear in each vertical bar indicate the magnitude of difference from this comparison student, and the stars indicate the level of statistical significance. Thus, if there is no difference in the learning gains, the bar would be missing entirely; if the learning of the student group in question is not as great as the comparison baseline, the bar is negative; and if the learning gains exceed the comparison, the bar is positive.

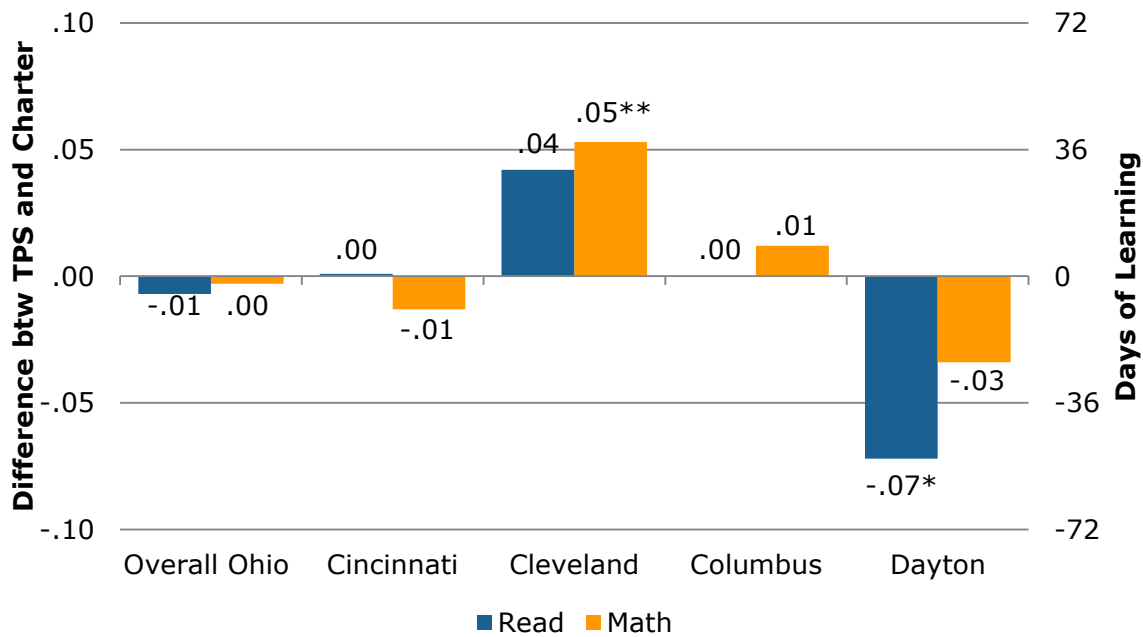
Graphs labeled "a" display the results of a second comparison testing whether the learning gains in the charter school student subgroup differs significantly from their peers in the same student subgroup in their feeder TPS. As with the first graph, stars denote statistical significance.

Figure 9: Learning Gains of Black Students Benchmarked Against TPS White Student Learning Gains



Overall in Ohio, Black students in both TPS and charter schools have significant learning deficits compared to average White TPS students, the baseline comparison, in both reading and math. The results by city suggest the learning differences between Black and White students are smallest in Cleveland charter school students and largest for Black students in Dayton charter schools. Figure 9a displays the differences in learning between Black students enrolled in TPS and charter schools.

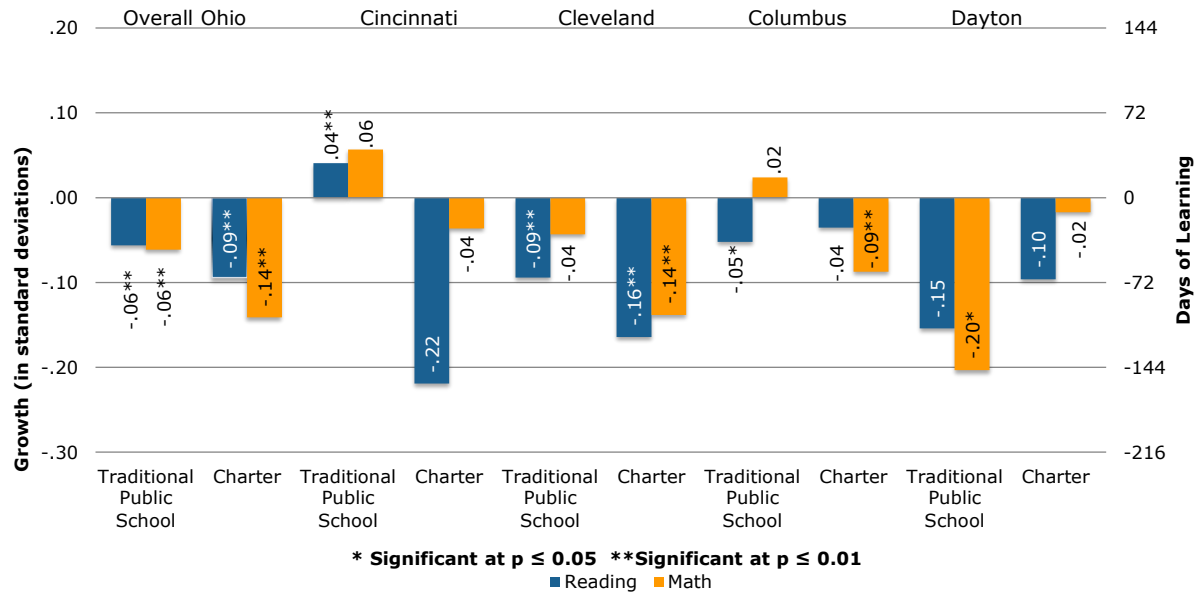
Figure 9a: Relative Learning Gains for Black Charter School Students Benchmarked Against their TPS Black Peers



* Significant at $p \leq 0.05$ ** Significant at $p \leq 0.01$

Overall, in Ohio, there is no difference in learning for either math or reading between Black students in charter schools and Black students in TPS. Of the featured cities, Cincinnati and Columbus follow the same trend of Ohio overall, showing no significant differences in learning between Black charter students and TPS students in either reading or math. In Cleveland, Black students in charter schools perform significantly better in math than students in TPS. This difference equates to 36 days of learning. In Cleveland, Black charter students appear to perform better in reading than their Black TPS counterparts; however this difference does not reach statistical significance. In Dayton, the opposite appears to be true. Black charter students in Dayton perform significantly worse than Black students in TPS in reading. In Dayton, Black charter students fall behind Black TPS students by 50 days of learning in reading. In math, Black charter students look to be performing worse in math than Black TPS students; however this difference is not significantly different.

Figure 10: Learning Gains of Hispanic Students Benchmarked Against TPS White Student Learning Gains

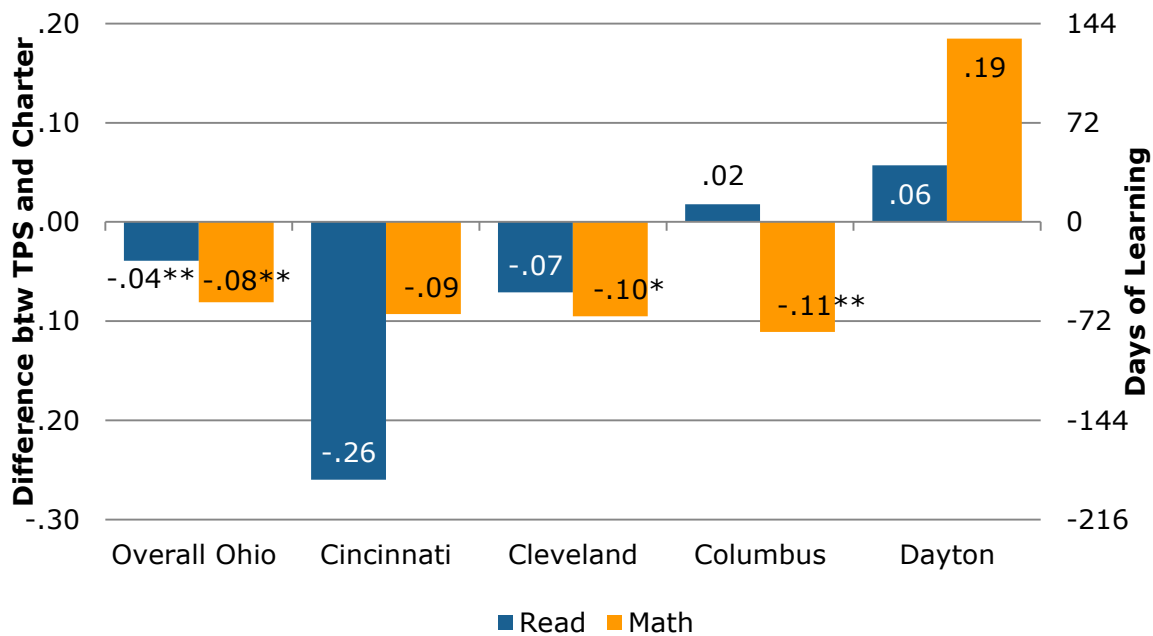


Overall in Ohio, Hispanic students in both TPS and charter schools have significant learning deficits compared to average White TPS students, the baseline comparison, in both reading and math. Hispanic students in charter schools perform worse in both reading (65 days behind) and math (100 days) compared to Hispanic students in TPS (43 days behind for reading and math). The results by city are mixed both by the individual city and the subject. In reading, Cleveland Hispanic students have significantly lower growth in reading in TPS (65 days behind) and in charter schools (115 days behind). In math, Cleveland Hispanic charter students perform worse than White TPS students by nearly 101 days of learning. The result for Cleveland TPS students is negative, but not significant. In Columbus, Hispanic TPS students perform significantly worse than the average White TPS student in reading (36 days of learning), but do not differ significantly from White students in math. Charter students in Columbus achieve significantly less in math than the average White TPS student (about 65 days of learning), but do not differ significantly from White TPS students in reading. Note that results should be interpreted with extreme caution in both Cincinnati and Dayton, where the number of Hispanic students included in the analyses is quite small and results were not significant (excepting TPS math in Dayton).

Figure 10a displays the relative differences in learning between Hispanic students enrolled in TPS and charter schools. Across all charter schools in Ohio, Hispanic students in traditional public schools perform significantly better than Hispanic students attending charter schools. Charter students who are Hispanic record 28 and 58 fewer days of learning in reading and math respectively, compared to Hispanic students attending TPS.

The breakout comparison for the cities of interest presents a more varied picture of Hispanic student learning in charter schools. Despite large differences in learning in Cincinnati, the small number of Hispanic students enrolled in charter schools in Cincinnati makes the differences statistically indistinguishable from zero. Hispanic charter students in Cleveland show no difference in reading learning compared to their TPS peers, but lag in math learning by 72 days. Almost identical results were seen for Columbus, where the math learning result for Hispanic charter school students was a gap of 79 days. In Dayton, the results appear positive but are not statistically significant.

Figure 10a: Relative Learning Gains for Hispanic Charter School Students Benchmarked Against their TPS Hispanic Peers



* Significant at $p \leq 0.05$ ** Significant at $p \leq 0.01$

Charter School Impact with Students in Poverty

Much of the motivation for developing charter schools aims at improving education outcomes for students in poverty. The enrollment profiles of charter schools across the country underscore this fact; in Ohio, 74 percent of charter students are eligible for subsidized school meals, a proxy for low income households (compared to 45% of TPS students). Thus, the impact of charter schools on the learning of students in poverty is important in terms of student outcomes and as a test of the commitment of charter school leaders and teachers to address the needs of this population. Figure 11 presents the results for students in poverty. In this graph, the comparison student is a student who pays full price for school meals in TPS, a proxy for not being in poverty.

Figure 11: Learning Gains of Students in Poverty Benchmarked Against TPS Non-Poverty Student Learning Gains

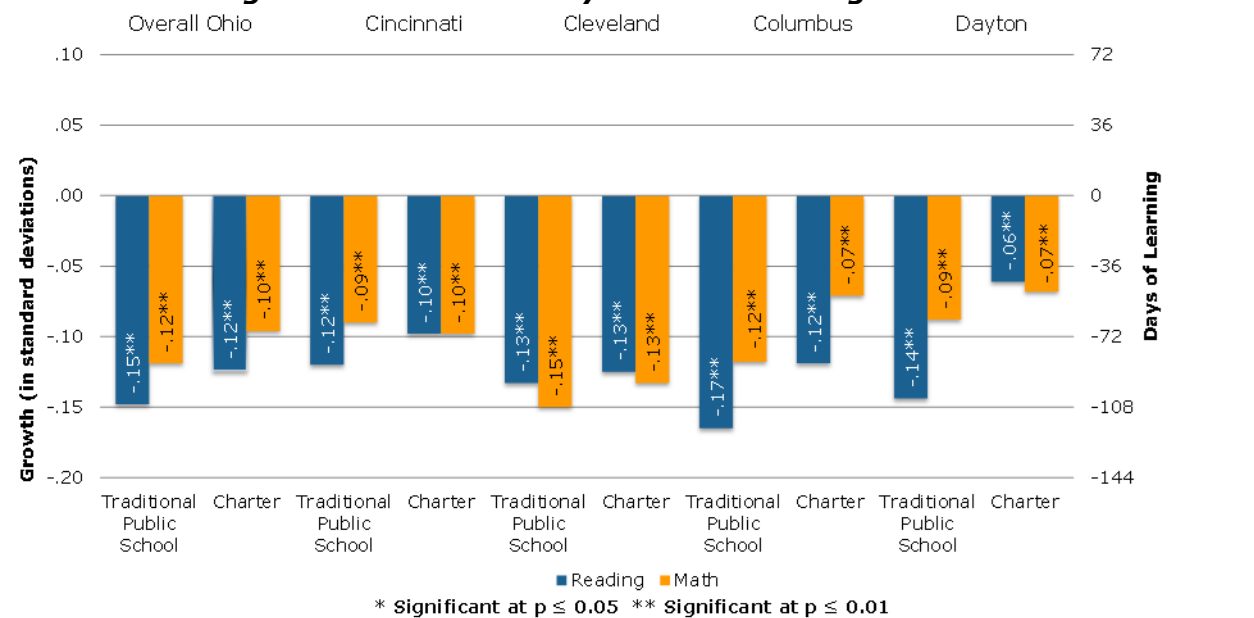
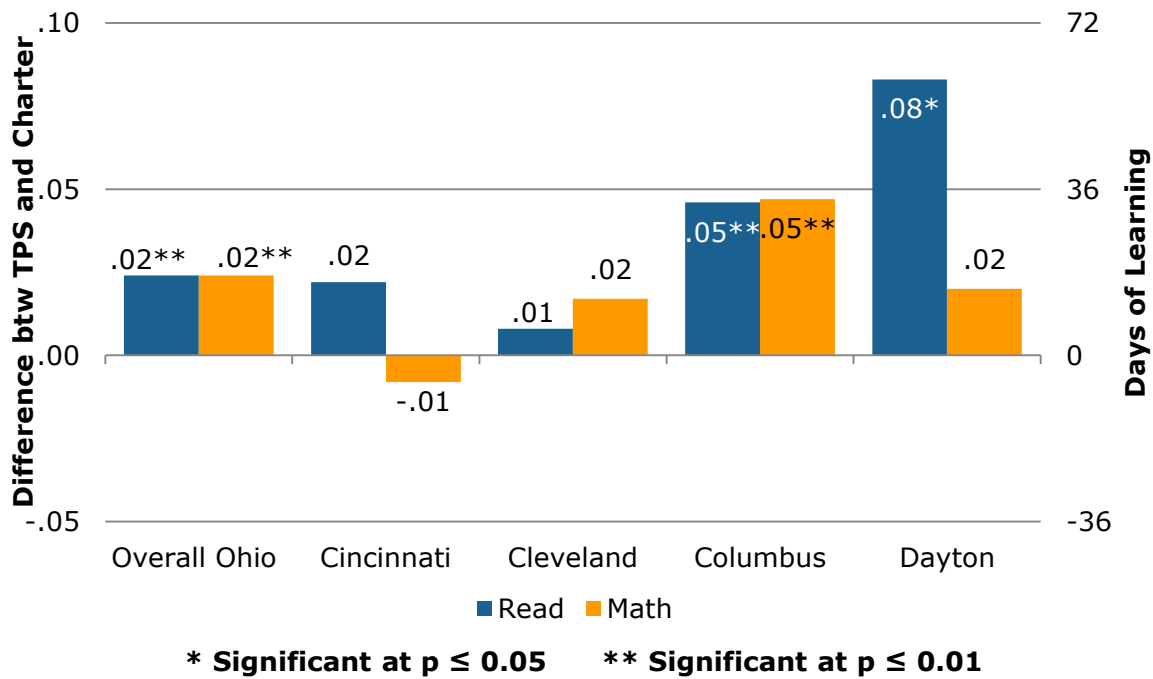


Figure 11a: Relative Learning Gains for Charter School Students in Poverty Benchmarked Against their TPS Peers in Poverty



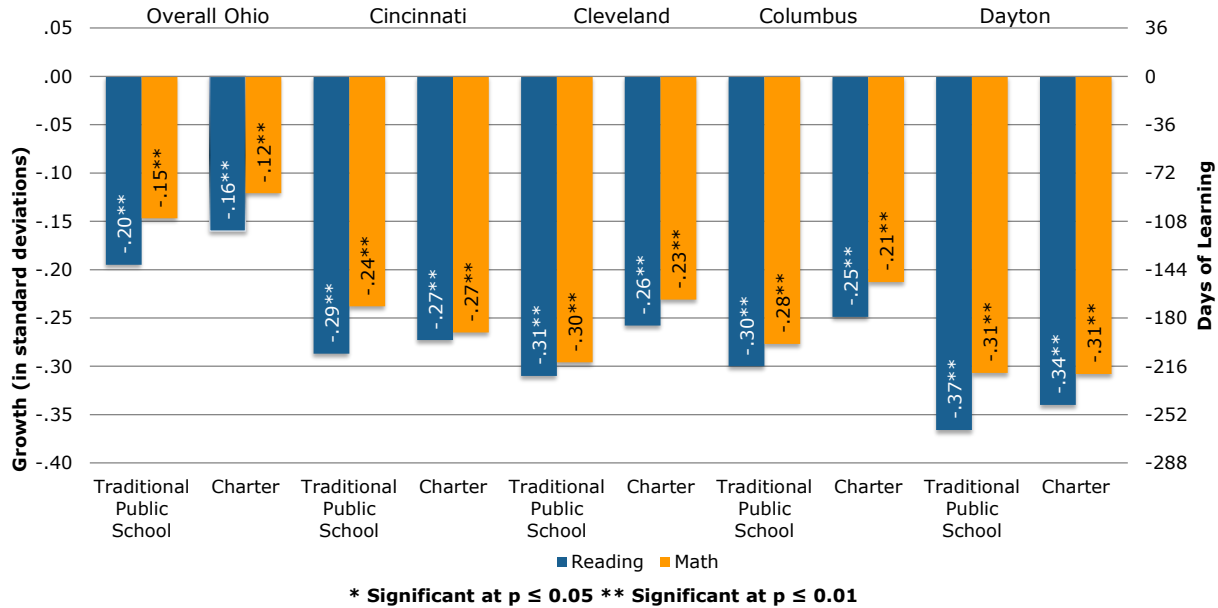
As shown in the figure above, in Ohio, students in poverty perform significantly worse than their non-poverty peers regardless of whether they attend a TPS or a charter. However, students in poverty who are enrolled in charter schools generally perform significantly better in both reading and math compared to students in poverty in TPS as shown in Figure 11a. Charter students in poverty have a 14 day learning advantage in both reading and math compared to their virtual peers. Academic growth for charter students in poverty in the cities examined are different than the state of Ohio, overall. Charter students in poverty in Columbus are 36 days of learning ahead of their TPS peers in both reading and math. In Dayton, charter students in poverty had a 58-day learning advantage over their TPS peers in reading. All other differences were insignificant.

Charter School Impact with Race/Ethnicity and Poverty

The most academically deprived students in public education are those who are both living in poverty and are members of a historically underserved racial or ethnic minority. This report examines two of the most challenged groups in the United States: Black students living in poverty and Hispanic students living in

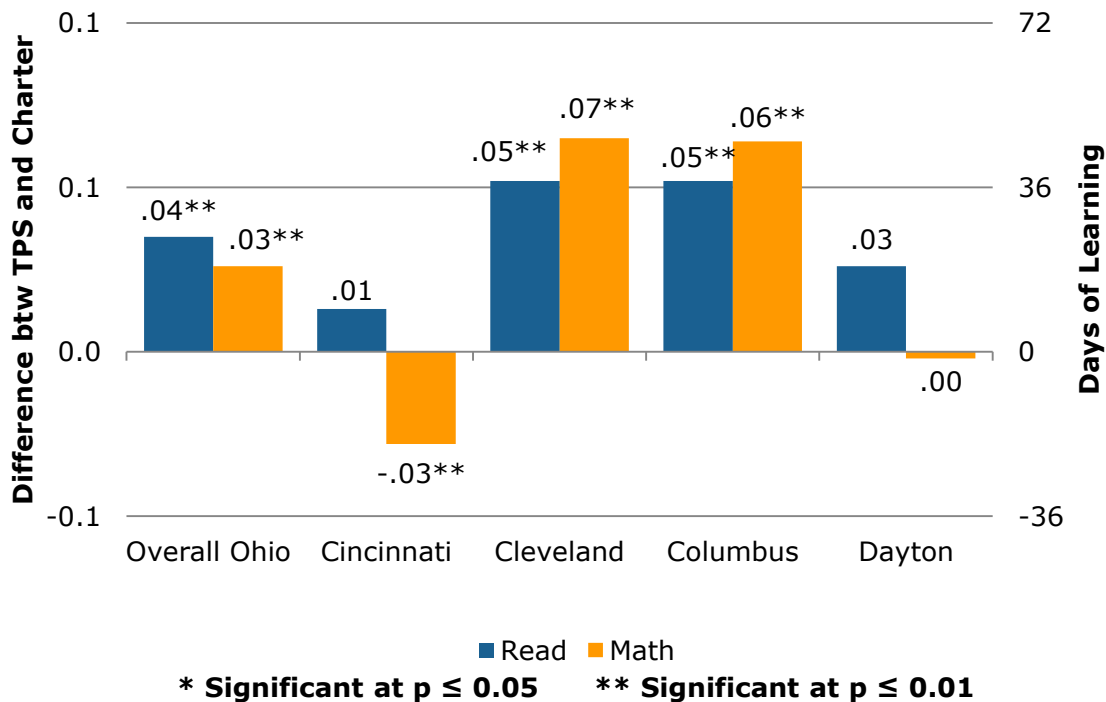
poverty. Within the national charter school community, these groups receive special attention. The impact of charter schools on the academic gains of Black students living in poverty is presented in Figure 12 and Figure 12a. Impact on Hispanic students living in poverty is presented in Figure 13 and 13a below.

Figure 12: Learning Gains of Black Students in Poverty Benchmarked Against TPS White Non-Poverty Student Learning Gains



As shown in Figure 12 Black students living in poverty perform significantly worse than White students not in poverty in TPS. Overall in Ohio, Black students in TPS have 144 fewer days of learning in reading and 108 fewer in math than White students in TPS, the baseline comparison group. Black students in poverty in each of the featured cities follow the a similar pattern of significantly worse performance as the state overall.

Figure 12a: Relative Learning Gains for Black Charter School Students in Poverty Benchmarked Against their TPS Black Poverty Peers



In a head-to-head comparison of learning gains, Black students in poverty in charter schools tend to outperform Black TPS students in both math and reading, as shown in Figure 12a. Across all charter schools in Ohio, Black students in poverty have about 29 more days of learning in reading and 22 days in mathematics than impoverished Black students attending TPS. Black charter students in poverty in Cleveland and Columbus appear to be driving the overall impact of charter schools on Black students in poverty. Black students in poverty in both Cleveland and Columbus are 36 days of learning ahead of Black students in poverty attending TPS in reading. In math, Black charter students in poverty outperform their TPS peers by more than 50 days of learning in Cleveland, and by 43 days of learning in Columbus.

Like Black students in poverty, Hispanic students in poverty perform below White students who are not in poverty in both reading and math. TPS-attending Hispanic students in poverty are an average of 58 days of learning behind in reading and 29 days of learning in math behind White TPS students who are not in poverty. Hispanics in poverty attending charter school are an average of 72 days of learning behind in reading and 65 days of learning behind in math.

Figure 13: Learning Gains of Hispanic Students in Poverty Benchmarked Against TPS White Non-Poverty Student Learning Gains

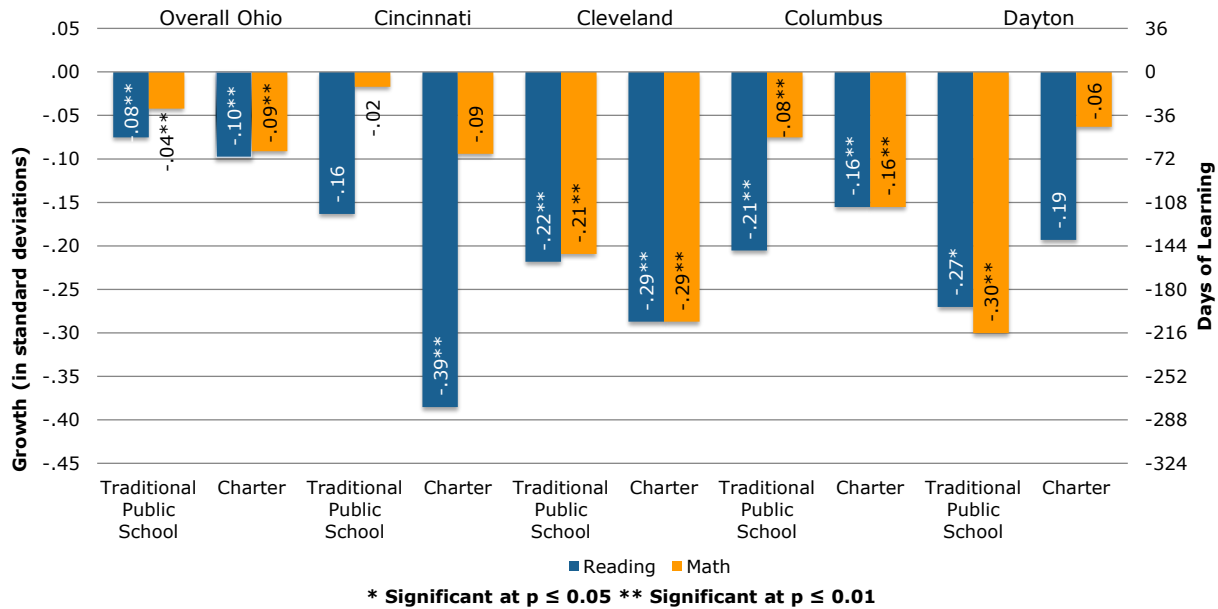
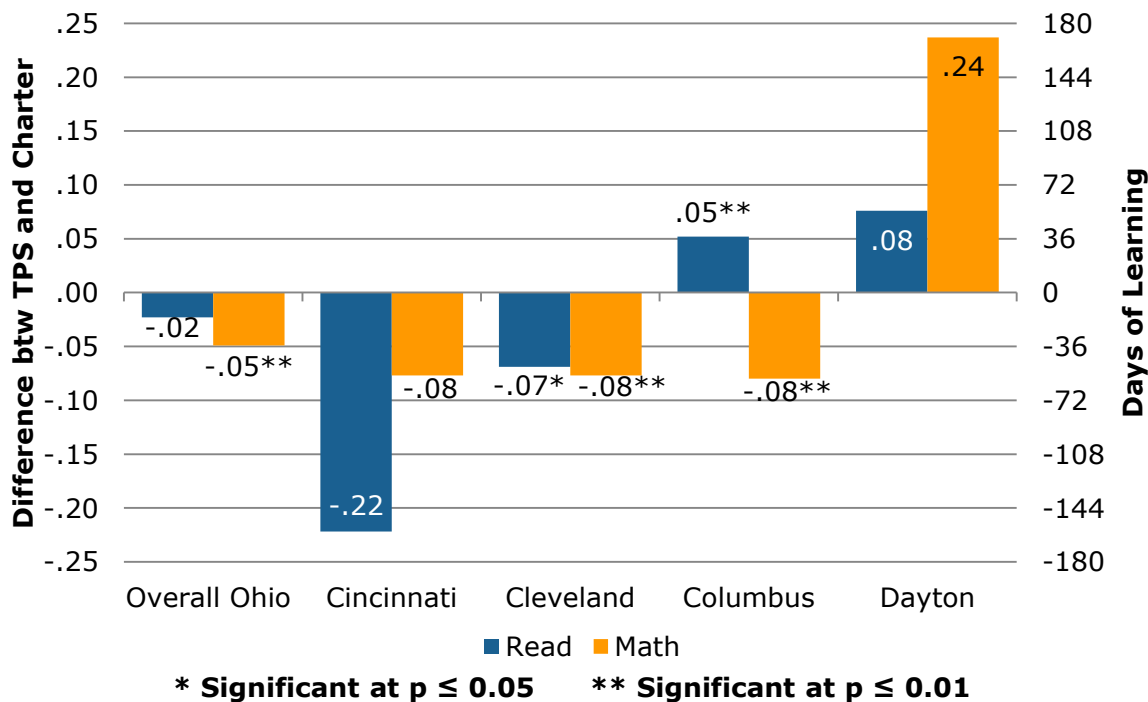


Figure 13a shows the difference between TPS Hispanic students in poverty who attend charter schools and Hispanic students in poverty that attend TPS. In Ohio overall, Hispanic students in poverty that attend charter schools have significantly lower achievement than Hispanic students in poverty in mathematics (the difference is about 36 days of learning). In Cleveland, TPS Hispanic students in poverty perform significantly worse than their peers in both reading and math. In Columbus the results are mixed: charter Hispanic students in poverty have significantly higher achievement in reading than do their virtual TPS peers, but have significantly lower achievement in math.

Figure 13a: Relative Learning Gains for Hispanic Charter School Students in Poverty Benchmarked Against their TPS Hispanic Poverty Peers

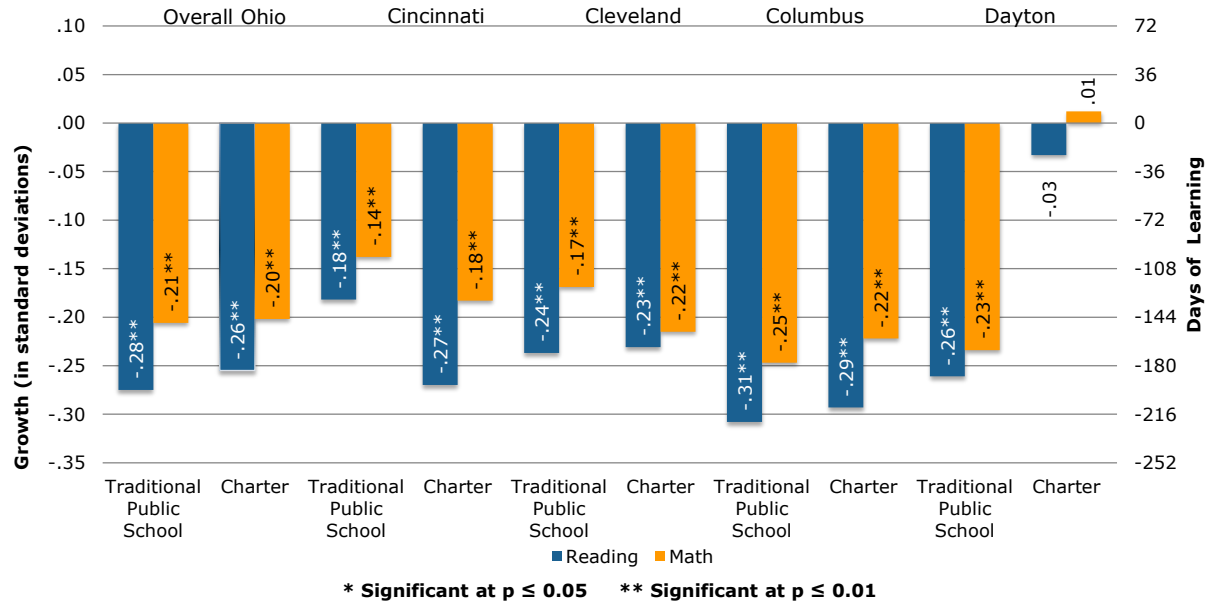


Charter School Impact with Special Education Students

The demographic comparisons in the CREDO national charter school report released in 2009 indicated that across the charter sector, schools serve fewer Special Education students than the traditional public schools both in number of students and as a proportion of their enrollment. In some cases, this is a deliberate and coordinated response with local districts, based on a balance of meeting the needs of the students and a consideration of cost-effective strategies for doing so. We do not find this disparity in Ohio where the overall proportion of charter school students who have Special Education needs is 16 percent, compared to 16 percent in TPS statewide and 15 percent in the charter schools' feeder schools. It is especially difficult to compare the outcomes of Special Education students, regardless of where they enroll. In the ideal, we would restrict the comparison by Individual Education Program (IEP) designation and only include students who were matched in all ways including IEP designation. That approach faces real challenges, however, because of small numbers of cases that match between charter schools and their feeder schools. Accordingly, it is necessary to

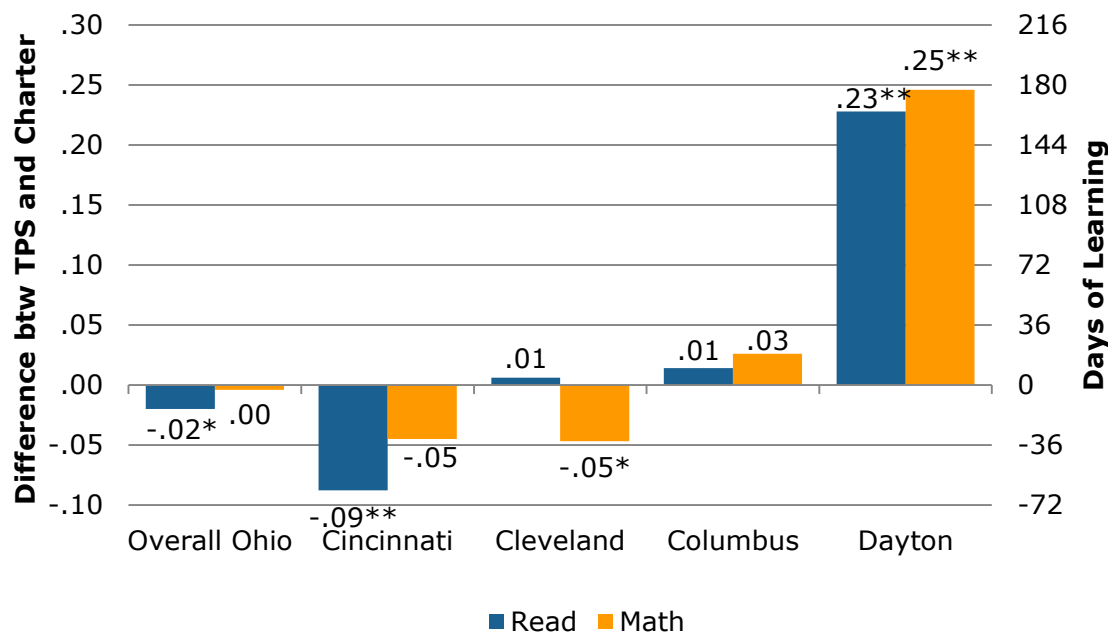
aggregate across all categories. As a result, the results presented in Figure 14 and Figure 14a should be interpreted with caution.

Figure 14: Learning Gains of Special Education Students Benchmarked Against TPS Non-Special Education Student Learning Gains



Special Education students enrolled in both TPS and charter schools perform significantly worse than TPS students who do not receive special education services. Overall, Special Education students in Ohio charter schools perform better than their counterparts in TPS in reading and math. Compared to students not receiving special education services, Special Education students in TPS in Ohio are 202 days of learning behind in reading and 151 days of learning behind in math. Comparatively, Special Education students in charter schools fell behind 187 days in reading and 144 days in math. Interestingly, in Dayton, while TPS students with Special Education needs have less learning in a year in both subjects, there are no statistical differences in performance for charter school Special Education students and those not receiving special education services.

Figure 14a: Learning Gains of Special Education Charter School Students Benchmarked Against TPS Special Education Student Learning Gains



* Significant at $p \leq 0.05$ ** Significant at $p \leq 0.01$

Charter School Impact with English Language Learners

Nationally, students who enroll in school without sufficient English proficiency represent a growing share of public school students. Their success in school today will greatly influence their success in the world a decade from now. Since their performance as reflected by National Assessment of Education Progress lags well behind that of their English proficient peers, their learning gains are a matter of increasing focus and concern nationally. The situation is different in Ohio, where students who are English Language Learners occupy a small fraction of the student population, around 3 percent of all students. Nonetheless, they present instructional challenges to schools that merit examination.

The comparison of learning gains of charter school English Language Learners and their TPS counterparts appears in Figure 15. The baseline of comparison is the typical learning gain of the comparison peers in traditional public schools who are proficient in English. As mentioned in a previous section, only 15 percent of students identified as English Language Learners could be matched. Due to small numbers of matches, this breakout analysis could only include Cleveland and Columbus. Of all the facets of the current study, this one deserves the greatest

degree of skepticism. With this cautionary note, the results are presented in Figure 15 below.

Figure 15: Learning Gains of ELL Students Benchmarked Against TPS Non-ELL Student Learning Gains

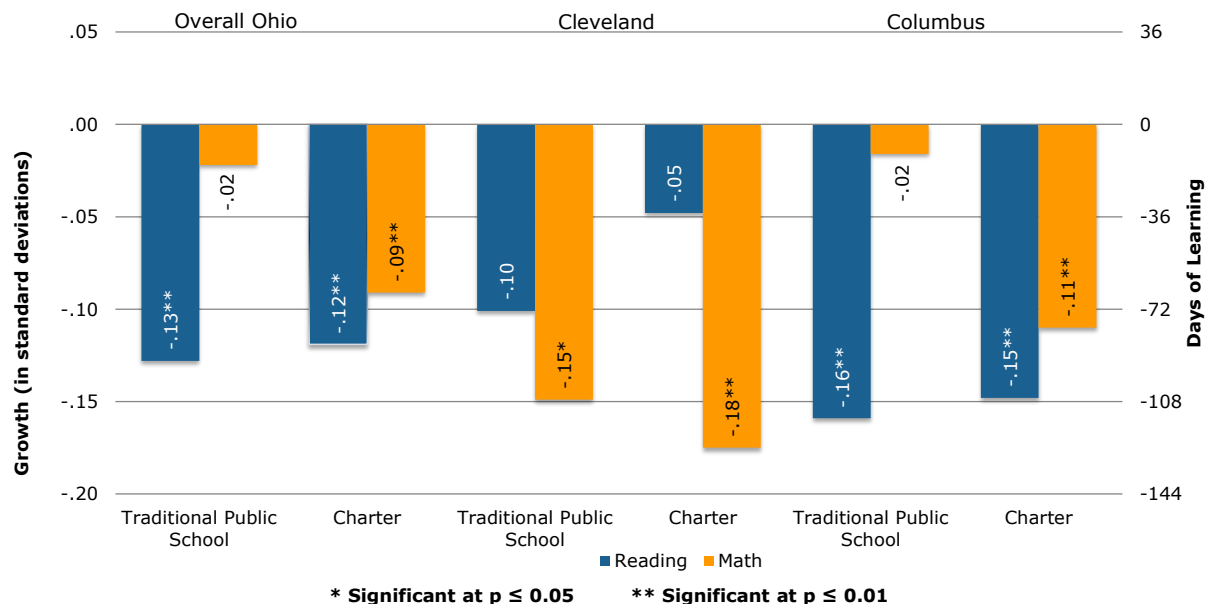
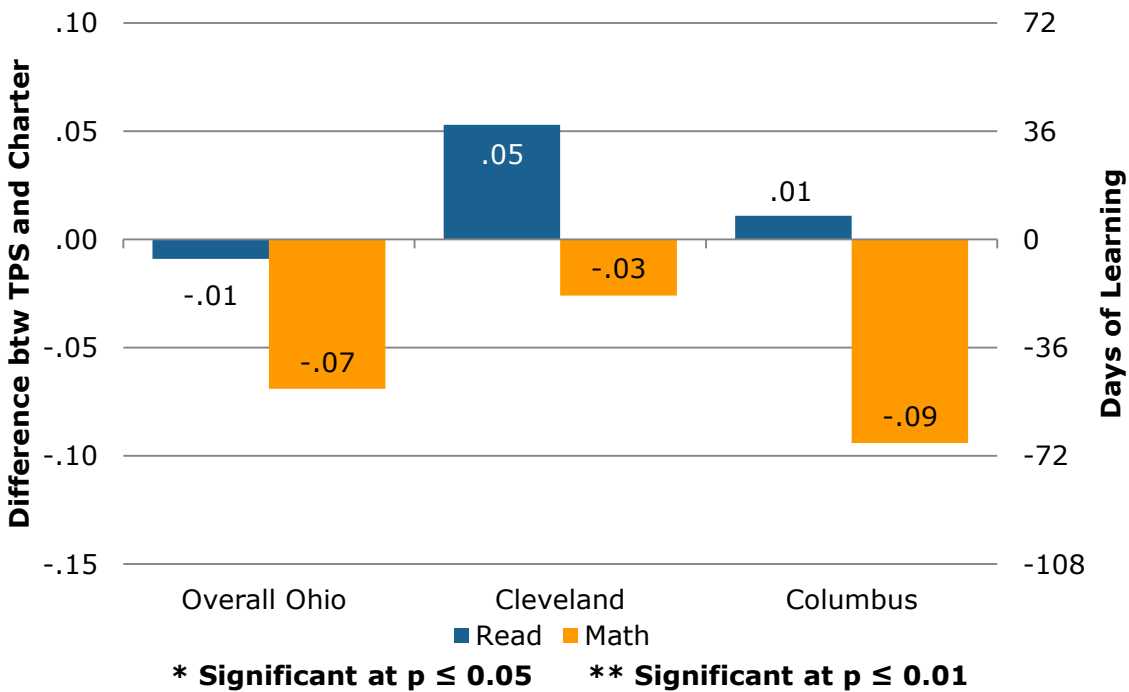


Figure 15 shows considerable variation in the learning of English Language Learners across Ohio. Overall, English Language Learner students in both TPS and charter schools learn significantly less per year than native/fluently English speakers in reading, amounting to a gap of 94 days of learning for TPS students and 86 days for English Learners students in charter schools. In math, charter school English Learners post inferior results to their TPS peers who are learning at the same rate as fluent TPS students; charter students who are English learners posted 65 fewer days of learning compared to the benchmark.

The results for Cleveland and Columbus tell a different story. In Cleveland, English Language Learners have similar learning in reading to their fluent peers, regardless of where they are enrolled. The opposite is true for Columbus, where English Language Learners lag behind their fluent peers in both settings. For math, both Cleveland's and Columbus's English Language Learners in charter schools have worse results than their TPS peers, but Columbus TPS students who are English Language Learners have no different learning than their fluent peers.

Despite these differences in academic progress compared to their fluent TPS peers, when the outcomes of English Language Learners are compared TPS-to-Charter Schools, Figure 15a makes clear that none of the differences are statistically significant. Again, small numbers of students in the analysis, especially in the city breakouts, makes finding statistically significant results difficult.

Figure 15a: Learning Gains of ELL Charter School Students Benchmarked Against TPS ELL Student Learning Gains



Charter School Impact by Student’s Starting Decile

A general tenet of charter schools is a commitment to the education and development of every child regardless of prior educational endowments. Many charter schools have, as part of their mission, a specific emphasis on serving students who have not thrived academically in TPS and whose early performance is well below average. We examined the performance of charter schools to see if they produced equivalent results across the spectrum of student starting points and in relation to the results observed for equivalent students in TPS.

To do this, baseline achievement test scores in reading and math for charter students and their VCRs were disaggregated into deciles. In this analysis, the base of comparison is the average academic growth of the TPS students in Decile 5, which corresponds to students in the 50th to 60th percentiles in the state. Student achievement growth in each decile for charter school students and their VCRs was then compared. The results appear in Figures 16, 16a and 17, 17b below.

Figure 16: TPS and Charter School Student Learning Gains by Students' Starting Decile Benchmarked by TPS Students in the 5th Decile– Reading

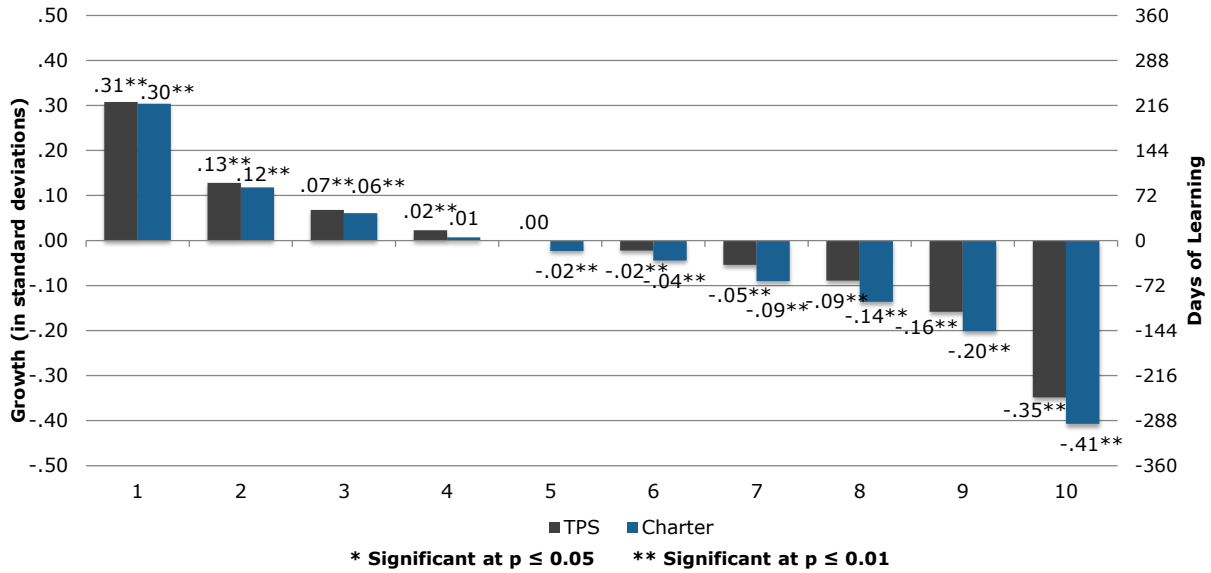


Figure 16a: Charter School Student Learning Gains by Students' Starting Decile Benchmarked against TPS Student Learning Gain – Reading

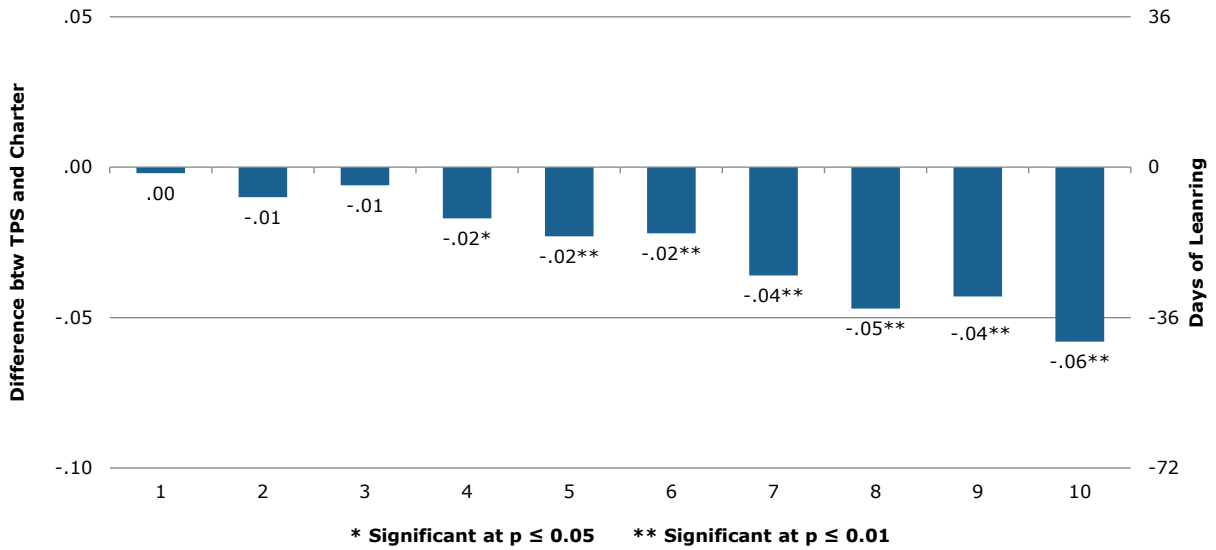


Figure 17: TPS and Charter School Student Learning Gains by Students' Starting Decile Benchmarked by TPS Students in the 5th Decile – Math

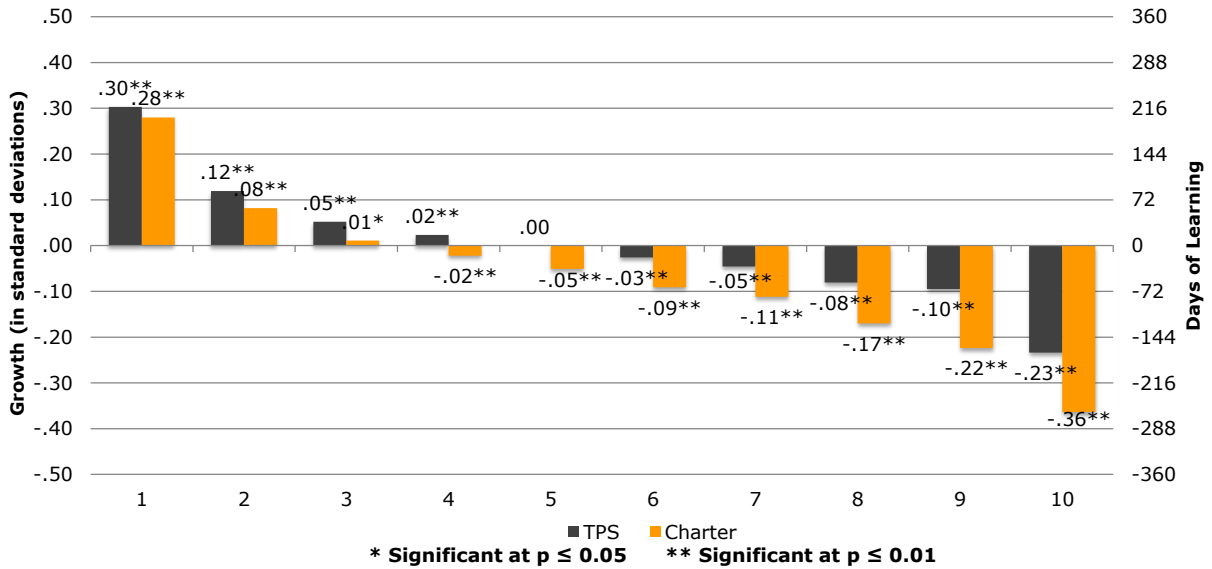
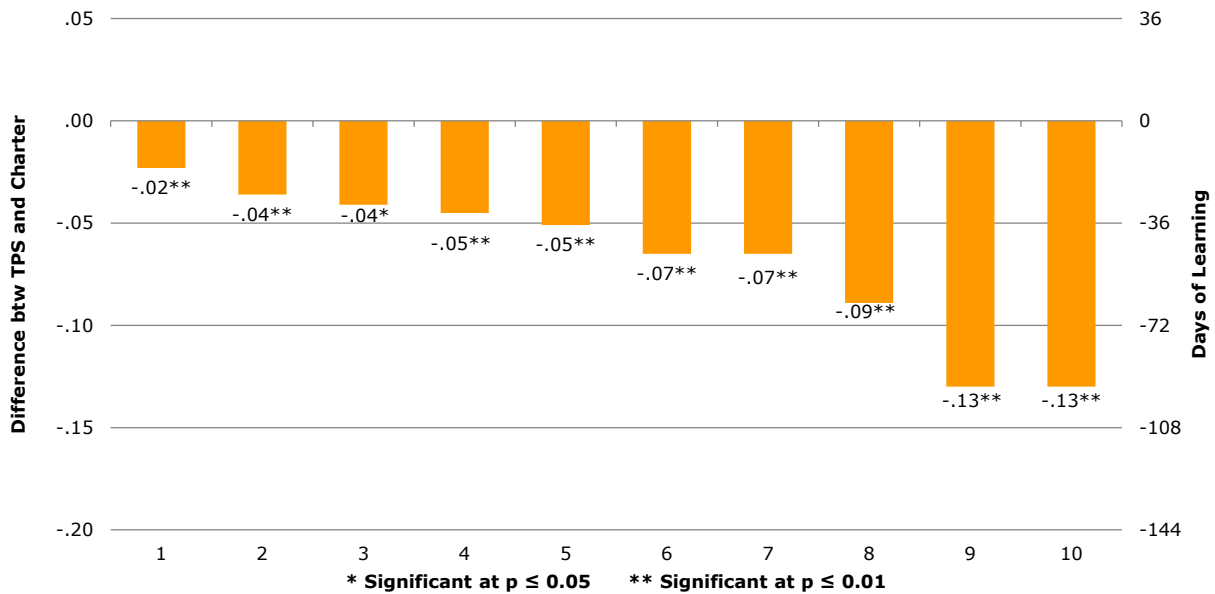


Figure 17a: Charter School Student Learning Gains by Students' Starting Decile Benchmarked against TPS Student Learning Gain – Math



Both figures demonstrate the expected “S”-shaped curve to the results. The overall curve reflects the typical pattern of larger learning gains for students with lower prior scores and larger learning losses for students with higher starting scores, a phenomenon known as “regression to the mean.” Here, the relative magnitudes are important: Do charter schools produce relatively better growth results than TPS? If so, the charter curve would have larger gains on the low end and smaller losses on the high end of the distribution.

For students in Ohio, Figures 16 and 17 show that charter schools generally do worse than TPS across the range of starting deciles. The results are more negative for math than for reading, but for both subjects, the pattern shows worsening results as students' starting scores rise. In other words, the better the student at the start of the year, the worse they are served in charter schools compared to what they would have learned in TPS.

School-level Analysis

Comparative School-level Quality While the numbers reported above represent the average learning gains for charter school students across the state, the pooled average effects tell only part of the story. Parents and policymakers are primarily interested in school-level performance. In order to determine the current distribution of charter school performance, the average effect of charter schools on student learning over the two most recent growth periods (2011 and 2012) is compared to the experience the students would have realized in their local traditional public schools.⁹ The educational market consists of VCR students matched with each student in a given charter school. This analysis provides an average contribution to student learning gains for each charter school. This measure is called the school's "effect size"; as for the overall and by-year impacts, it is expressed in standard deviations of growth.

As noted in Table 1, charter schools are slightly smaller on average than their corresponding feeder schools. In addition, some charter schools elect to open with a single grade and mature one grade at a time. Consequently, care is needed when making school-level comparisons to ensure that the number of tested students in a school is sufficient to provide a fair test of the school's impact. Our criteria for inclusion were at least 60 matched charter

While the numbers reported above

A Note about Tables 6 and 7

There are four quadrants in each table. We have expanded on the usual quadrant analysis by dividing each quadrant into four sections. The value in each box is the percentage of charter schools with the corresponding combination of growth and achievement. These percentages are generated from the 2011 and 2012 periods.

The uppermost box on the left denotes the percentage of charters with very low average growth but very high average achievement. The box in the bottom left corner is for low-growth, low-achieving schools.

Similarly, the topmost box on the right contains the percentage of charters with very high average growth and very high average achievement, while the bottom right corner contains high-growth, low-achieving schools.

The major quadrants were delineated using national charter school data. We would expect about 46% of schools to have an effect size between -0.15 and 0.15 standard deviations of growth (the two middle columns). Similarly, we would expect about 50% of schools to achieve between the 30th and 70th percentiles. Therefore, if schools were randomly distributed, we would expect about 6% in any small square and about 25% of the schools to appear in the middle four squares.

⁹ We chose to include only the two most recent growth periods in this analysis for two reasons. First, we wanted a highly relevant contemporary distribution of charter school performance. Second, using only two periods of data ensured that all schools' effect sizes were measured fairly; they are all based on one or two periods of data instead of one period for some schools and five periods for others.

student records over the two years, or, for new schools with only one year of data, at least 30 matched charter records. Our total sample is 148 schools with math scores and 147 schools with reading test scores in 2011 and 2012. Table 4 below shows the breakout of performance for the Ohio charter schools that meet our criteria for inclusion by having a sufficient number of charter student records.

Table 4: Performance of Charter Schools Compared to Their Local Schools in Ohio

Subject	Significantly Worse		Not Significantly Different		Significantly Better	
	Number	Percent	Number	Percent	Number	Percent
Reading	27	18.4%	92	62.6%	28	19.0%
Math	35	23.6%	72	48.6%	41	27.7%

In reading, 19 percent of charter schools perform significantly better than their traditional public school analogs, while 27.7 percent perform significantly better in math. Both of these results are slightly behind the national average proportion of better-performing charters in which 25 percent outperform their local counterparts in reading and 29 percent do so in math¹⁰. Alternatively, 18 percent of Ohio charter schools post reading results that are significantly worse than the local TPS option, and 24 percent of Ohio charter schools do so for math. The largest proportion of charter schools in Ohio do not differ significantly from traditional public schools in their communities, at 63 percent in reading and 49 percent in math.

Table 5 displays breakouts for the Ohio cities included in this study. Thirteen schools (26 percent) in the featured cities perform significantly better than their TPS peer schools in reading and 17 schools (34 percent) perform significantly better in mathematics. These city results are better than the results for the state as a whole. Only charter schools in Cleveland perform better than the combined city average (30%) on both reading (33%) and math (33%). Columbus exceeds the combined city proportion of better-performing charters in math where about 43 percent of charter schools perform significantly better than their TPS markets.

¹⁰ CREDO (2013). *National Charter School Study 2013*. <http://credo.stanford.edu>.

Table 5: Performance of Charter Schools Compared to Their Local Schools by City

	Significantly Worse		Not Significantly Different		Significantly Better	
	Number	Percent	Number	Percent	Number	Percent
All Cities						
Reading	8	16.0%	29	58.0%	13	26.0%
Math	11	22.0%	22	44.0%	17	34.0%
Cincinnati						
Reading	3	30.0%	5	50.0%	2	20.0%
Math	5	50.0%	3	30.0%	2	20.0%
Cleveland						
Reading	1	6.7%	9	60.0%	5	33.3%
Math	1	6.7%	9	60.0%	5	33.3%
Columbus						
Reading	3	14.3%	13	61.9%	5	23.8%
Math	4	19.0%	8	38.1%	9	42.9%
Dayton						
Reading	1	25.0%	2	50.0%	1	25.0%
Math	1	25.0%	2	50.0%	1	25.0%

Impact of Growth on Achievement While the impacts of charter schools on academic growth relative to their local competitors is informative, it is also crucial to take a wide-angle view to determine how well these students are being prepared. Because many of the students served by charter schools start at low levels of achievement, it is vital to understand how well their academic growth advances them in absolute achievement. To do this, each school’s average growth

is placed in the context of their school wide achievement level compared to the rest of the state, as in Tables 6 and 7 below. We use the effect sizes discussed above to measure growth. The school's average achievement level is the mean achievement of the students over the same two periods covered by the effect size (2011 and 2012).¹¹ The 50th percentile indicates statewide average performance for all public school students (traditional and charter). A school achievement level above the 50th percentile indicates that the school's overall achievement exceeds the statewide average.

Table 6: Reading Growth and Achievement

Growth (in Standard Deviations)	Low Growth, High Achievement		High Growth, High Achievement		
	-0.15	0	0.15		
	0.0%	0.7%	0.0%	0.0%	70th Percentile
	0.0%	1.4%	1.4%	3.4%	50th Percentile
	1.4%	7.5%	15.6%	7.5%	30th Percentile
	10.9%	24.5%	21.8%	4.1%	
	Low Growth, Low Achievement		High Growth, Low Achievement		

In Ohio, 79 of the 147 charter schools (about 54 percent) had positive average growth in reading (this percentage is the sum of the squares in the blue and purple quadrants on the right half of the table). About five percent of charters had positive growth and average achievement above the 50th percentile of the state (i.e., the total for the blue quadrant on the top right) with 49 percent posting above average gains but remaining below the state average in absolute achievement. Forty-six percent of schools posted smaller learning gains than their local peer schools (the sum of light gray and dark grey quadrants.) Roughly 93 percent of charters perform below the 50th percentile of achievement (the sum of the gray and purple

¹¹ Average achievement was computed using students' z-scores from the end of the growth period (e.g., spring 2011 and spring 2012), and the resulting school-level mean was then converted into a percentile.

cells in the lower portion of the table). The area of greatest concern is the 44 percent of school that fall into the lower left quadrant of the figure. These schools are characterized by both low achievement and low growth.

Table 7: Math Growth and Achievement

Growth (in Standard Deviations)	Low Growth, High Achievement		High Growth, High Achievement		
	-0.15	0	0.15		
	0.0%	0.7%	0.0%	0.7%	70th Percentile
	0.7%	0.7%	3.4%	1.4%	50th Percentile
	0.0%	7.4%	8.1%	10.1%	30th Percentile
	18.2%	22.3%	19.6%	6.8%	
	Low Growth, Low Achievement		High Growth, Low Achievement		

For math, the charter schools in Ohio split evenly with respect to growth --74 of the 148 charter schools (50 percent) had positive average growth, as seen in the combined orange and pink quadrants, and 74 schools (50 percent) had growth that was smaller than the local TPS alternatives. Only five percent of charters had positive growth and average achievement above the 50th percentile (the orange quadrant). Similar to the results for reading in the previous table, approximately 93 percent of charters have achievement results below the 50th percentile of the state (the sum of lower half of the table). Of the 137 schools classified as having low achievement, 66 (those in the pink quadrants) have high growth and appear to be on an upward trajectory. As with reading, the schools of greatest concern are those schools in the lower left (brown) quadrant that have both low achievement and low growth; they number 71 and represent 48 percent of the charter schools in Ohio.

Impact of Charter Management Organizations

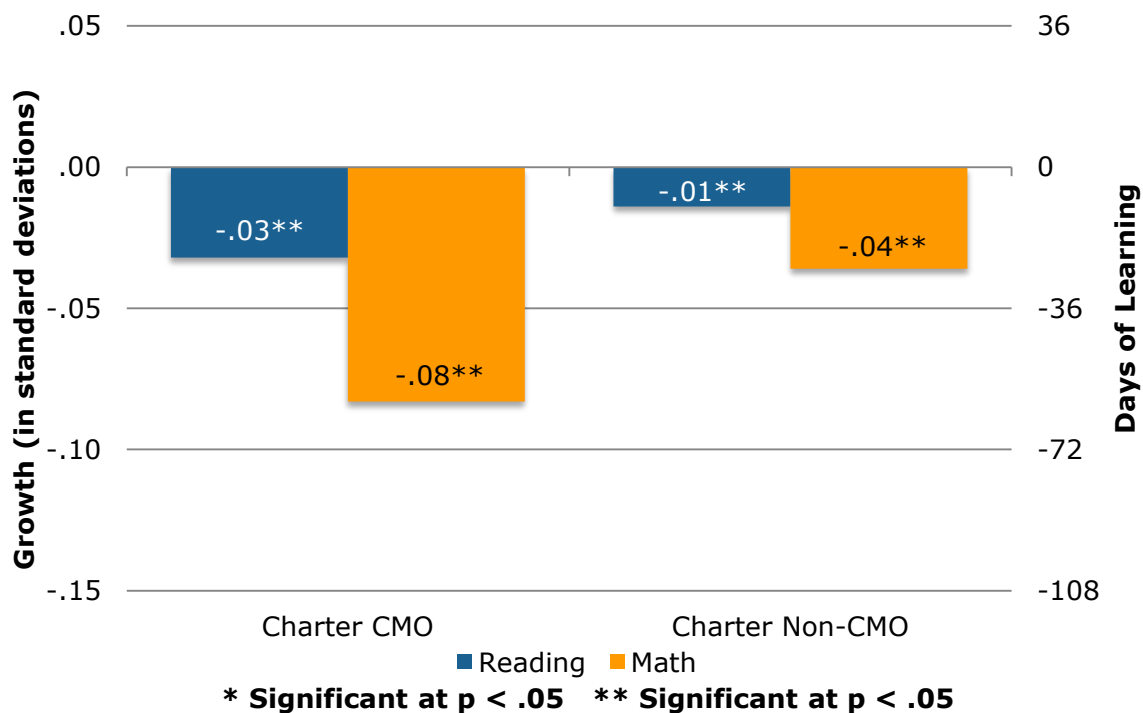
Charter Management Organizations (CMOs) are networks of schools that share a common leadership and operate multiple schools. We define CMOs as those organizations having three or more schools. We include in our analysis both not-for-profit and for-profit entities. CMOs have some operational advantages in their ability to spread administrative fixed costs over a larger number of schools or students, thus providing the possibility of greater efficiency. As well, with more schools and students than a single charter school operator, CMOs may be able to support additional programs and more robust staffing in their networks. Whether their organization leads to better student outcomes is a matter of interest across the United States.

Identifying all the CMOs in Ohio and associating them to their schools and students proved to be a challenge. This analysis only includes Ohio-based schools, even if a CMO had schools in other states. Ultimately we conducted this part of the study with 118 charter schools from 17 CMOs. We examine the comparative performance of charters that belong to charter management organizations (CMOs) and those who do not belong to CMOs. As with the earlier statewide graphs, each graph in this section displays two distinct comparisons:

The first graph displays the comparison in performance of charter school students who belong to CMOs and charter students who do not attend charter schools affiliated with CMOs to the "average statewide student in TPS." The values that appear in each vertical bar indicate the magnitude of difference from this comparison student, and the stars indicate the level of statistical significance. Thus, if there is no difference in the learning gains, the bar would be missing entirely; if the learning of the CMO charter student group is not as great as the statewide comparison baseline, the bar is negative; and if the learning gains exceed the comparison, the bar is positive.

The second graph compares the difference in learning between charter students who attend CMO charter schools and those who do not attend CMO charter schools. As with the first graph, stars indicate the level of statistical significance. The third graph compares the difference in learning by school level between charter students who attend CMO charter schools and those who do not attend CMO charter schools. As with the above graphs, stars indicate the level of statistical significance.

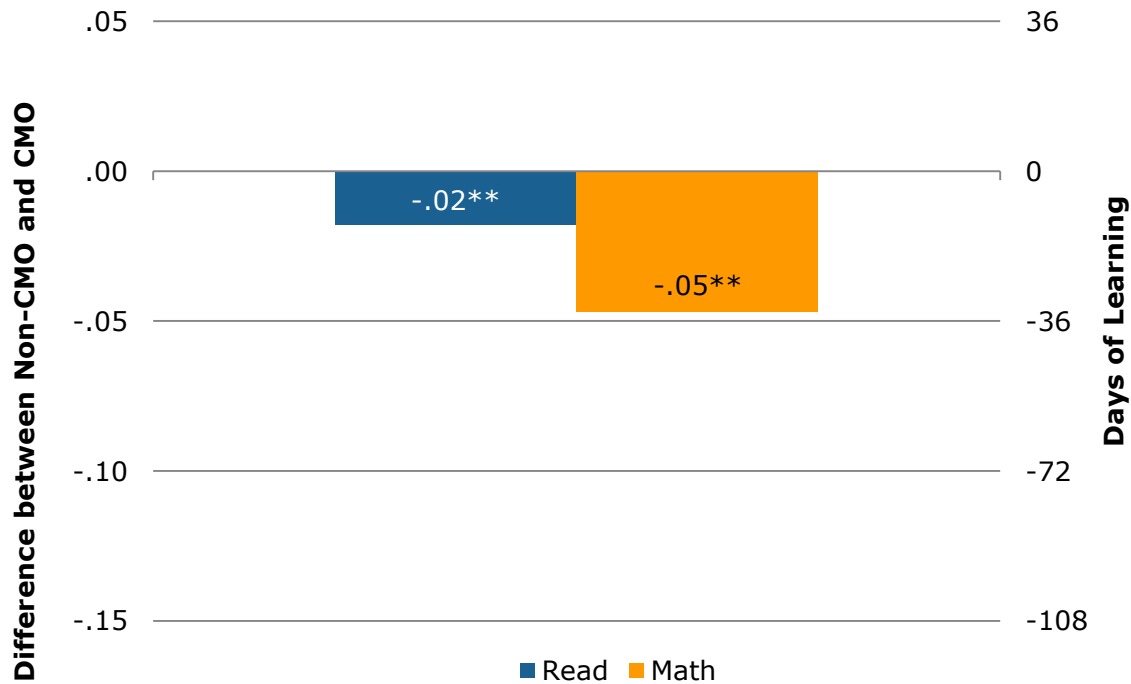
Figure 18: Average Student Learning Gains of Charter Management Organizations and Non-Network Charter Schools Benchmarked Against the Statewide Average TPS Student Learning Gain



Regardless of CMO affiliation, charter school students do not perform as well as the average TPS student in Ohio. What is noteworthy is the similarity across network status. CMO charter students are approximately 56 days of learning behind their peers in TPS in math and 21 days behind in reading. Non-CMO charter students are about 28 days of learning behind in math and about seven days behind in reading. The results depicted in Figure 18 suggest that on average, students enrolled in CMO charters are more disadvantaged in both reading and math learning gains than students in non-CMO charters schools.

Figure 18a displays the learning difference between students enrolled in non-CMO charters and those enrolled in CMO charters. CMO charter students have significantly lower growth in both math and reading than non-CMO charter students. In a year's time, CMO students are 35 days of learning behind non-CMO charter students in math and 14 days behind in reading.

Figure 18a: Comparison of Charter CMOs Learning Gains Benchmarked Against Charter Non-CMOs Learning Gains

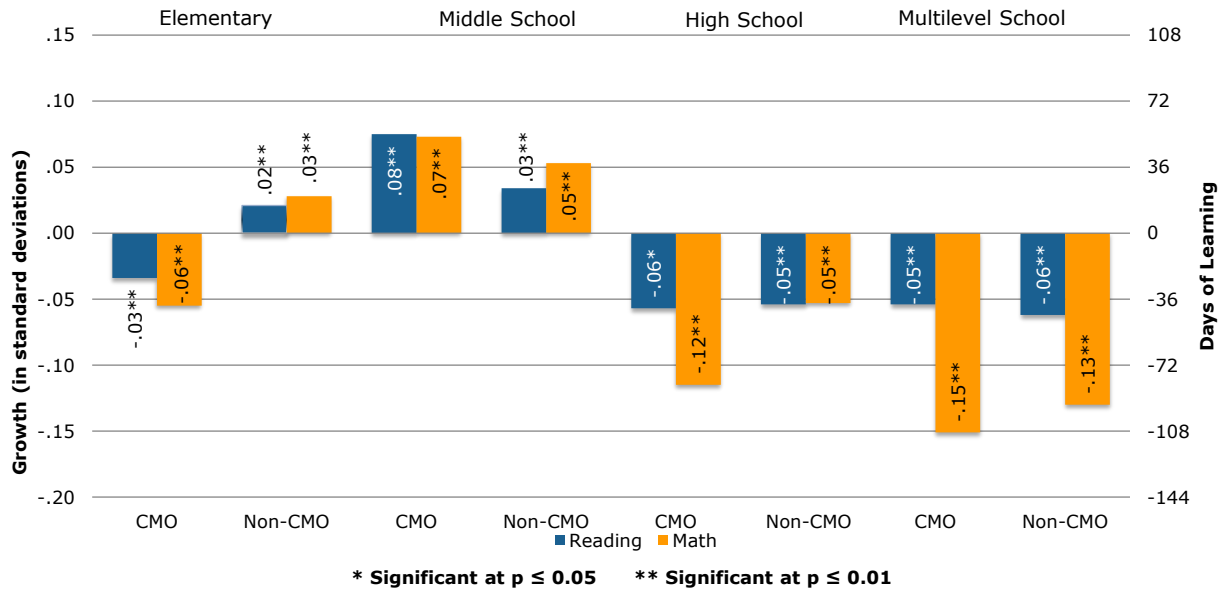


*** Significant at $p < .05$ ** Significant at $p < .01$**

The differences between CMO and non-CMO performance varies across school levels. As shown in Figure 19, students in charter middle schools which belong to CMOs outperform students in charter middle schools which do not belong to CMOs in both reading and math. Conversely, students in non-affiliated charter elementary schools outperform students in CMO-affiliated schools. In both high school and multilevel schools, charter students are outperformed by students in TPS; however, students in multilevel schools which do not belong to CMO perform significantly worse than students in charters which belong to CMOs in math.

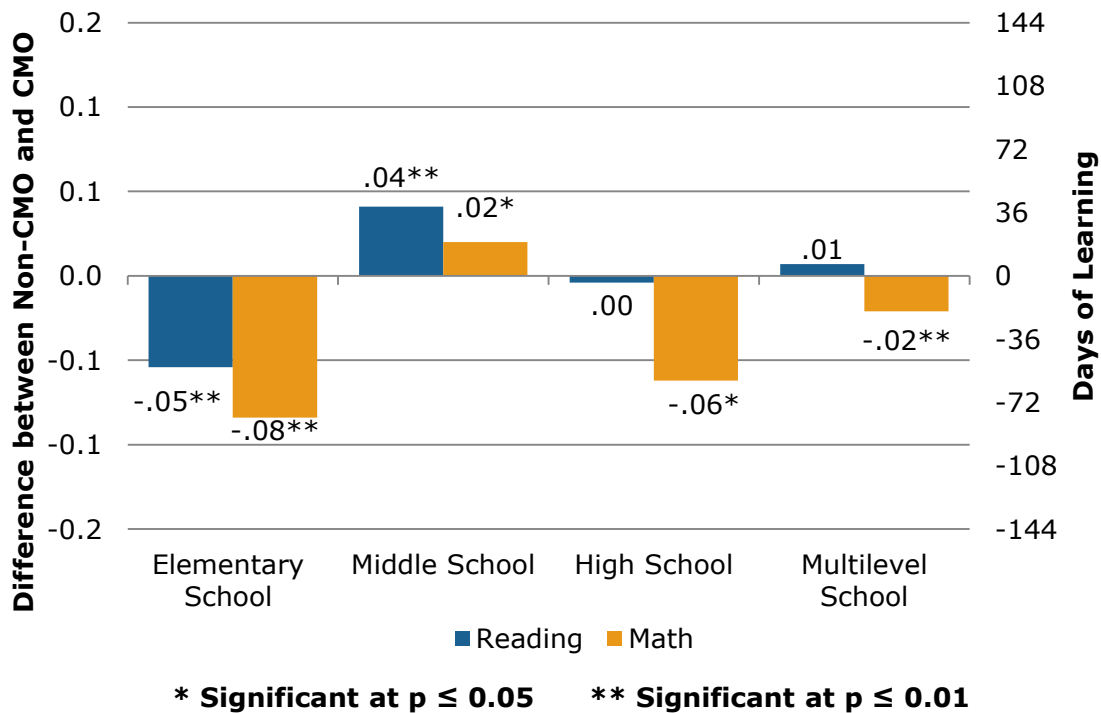
Charter middle school students, both CMO and non-CMO, perform better than students in TPS middle schools in both math and reading. This finding aligns with the school level analysis discussed previously. Charter elementary school students who attend schools that do not belong to CMOs perform better than TPS elementary school students.

Figure 19: CMO and Non-CMO Student Learning Gains by School Level Benchmarked Against TPS Learning Gains by School Level



As shown in Figure 19a, in both reading and math, students in charter middle schools which belong to CMOs outperform students in charter middle schools which do not belong to CMOs. Students in CMO schools realize 28 more days of learning in reading and 14 more days in math. Conversely, students in independent charter elementary schools outperform students in CMO-affiliated charter schools in both subjects amounting to a difference of 36 and 56 days of learning for reading and math, respectively. For high school and multilevel schools, there is no difference in performance for reading between the two types of charters; however, CMO-affiliated learning gains lag those in independent charter schools in math by 42 days in high schools and 14 days in multi-level schools.

Figure 19a: Comparison of Student Learning Gains in CMOs by School-Level Benchmarked Against Non-CMO Charter School Learning Gains



Authorizer Analysis

The authorizer landscape in Ohio is diverse; the number of authorizers who operate in a given year varies, as does the number of schools they authorize, which ranges between 1 and 70 schools. The heterogeneity in authorizers is grounded in the enabling legislation, which permitted a wider range of organizations to assume the role than in other states. Local education agencies, the Ohio Department of Education, regional offices of education, higher education institutions, and non-profit organizations all have the option to authorize charter schools. Consequently, charter school applicants and operators have considerable choice in their oversight body. Such diversity naturally raises questions about the absolute and comparative performance within the authorizer community in Ohio.

The authorizer diversity shaped the way in which the analyses were conducted. In this section, authorizer results are shown for all students and by four growth periods (2010, 2011, 2012 and 2013). In all the analyses in this section, the benchmark for comparison is the one-year academic learning of the TPS comparison twin. We first examine the academic progress of charter students in schools of 10 of Ohio’s largest authorizers, defined by the number of schools in a

given authorizer’s portfolio. We then examine the relation between authorizer size and location of schools in an individual authorizer’s portfolio. The final analysis in this section compares the academic growth of charter students by type of authorizer. In Ohio there are four types of authorizers, Higher Education Institutes (HEI), Local Education Agencies (LEA), Not-for-Profit organizations (NFP) and the State Education Agency (SEA).

The following authorizers are included in the first analysis of the 10 largest authorizers:

- Ashe Culture Center¹²
- Buckeye Community Hope Foundation
- Educational Resource Consultants of Ohio
- ESC of Central Ohio
- Kids Count of Dayton, Inc.
- Lucas County ESC
- Ohio Council of Community Schools
- Richland Academy¹³
- St. Aloysius Orphanage
- Thomas B. Fordham Foundation

Located in Table 8 are the ten largest authorizers in the state of Ohio. The first set of columns includes the average growth for each authorizer in reading and math over the years included in the analyses. The subsequent sets of columns include the reading and math growth values for each of the growth periods reported.

Over the years examined in the authorizer analysis, the large authorizers have posted variable performance. As seen in the first two columns of Table 8, charter students in schools authorized by three of the large authorizers have exceeded (Thomas B. Fordham Foundation) or were on pace with (Buckeye Community Hope Foundation and Educational Resource Consultants of Ohio) the average TPS student in both reading and math. By contrast, students in charter schools authorized by Lucas County, Ohio Council of Community Schools, and St. Aloysius Orphanage have performed worse than TPS, overall, in reading and math. Charter students authorized by the remaining authorizers on the list have comparable achievement to TPS students in reading, but achieve significantly less in math.

Perhaps the more interesting story is found in authorizer achievement over time. The charter schools in the Thomas B. Fordham Foundation and Buckeye Community

¹² Ashe Culture Center does not have data for 2012-2013

¹³ Richland Academy had fewer than five schools prior to 2011

Hope Foundation portfolios educate students to consistently higher levels of achievement than their TPS counterparts (with the exception of 2012 where performance was lower). St. Aloysius Orphanage and Ohio Council of Community Schools charter students have consistently lower gains in reading and math compared to the average TPS student. The charter school students belonging to the other authorizers on the list posted learning gains that either exceeded or were comparable to TPS students in the earlier years of the analysis but by the latter years of the analysis were performing significantly worse than TPS.

Most of the charter schools that are overseen by the aforementioned large authorizers are located in urban areas. This is not surprising as the charter movement has traditionally been most active in urban areas. The portfolio of schools of each of the authorizers, stratified by location, is depicted in Table 9. Only three authorizers (Buckeye Community Hope Foundation, Lucas County ESC, and Thomas B. Fordham Foundation) have attempted to extend their portfolio (15% or more of schools) beyond urban areas.

Table 8: Impact of Largest Authorizers by Growth Period 2010-2013

Name of Authorizer	2010-2013		2010		2011		2012		2013	
	Reading	Math	Reading	Math	Reading	Math	Reading	Math	Reading	Math
Ashe Culture Center	0.01	-0.07**	0.34**	0.24**	-0.19**	-0.26**	-0.25**	-0.31**	--	--
Buckeye Community Hope Foundation	0.00	0.00	0.04*	0.03*	0.04**	0.03**	-0.11**	-0.07**	0.02*	0.00
Educational Resource Consultants of Ohio	0.01	-0.01	0.06**	0.05**	0.07**	0.05**	-0.02	-0.05**	-0.09**	-0.09**
ESC of Central Ohio	0.00	-0.05**	0.08*	0.01	0.03	-0.05	-0.05	-0.15**	-0.04	-0.01
Kids Count of Dayton, Inc.	0.01	-0.08**	0.22**	0.18**	0.05*	0.00	-0.03	-0.25**	-0.16**	-0.17**
Lucas County ESC	-0.02**	-0.04**	0.02*	-0.01	0.04**	0.01	-0.10**	-0.09**	-0.02**	-0.06**
Ohio Council of Community Schools	-0.03**	-0.09**	0.03**	-0.05**	0.01*	-0.06**	-0.16**	-0.18**	-0.02**	-0.07**
Richland Academy	-0.15**	-0.15**	--	--	--	--	-0.15**	0.12**	-0.17**	-0.07
St Aloysius Orphanage	-0.07**	-0.08**	-0.05**	-0.07**	-0.03*	-0.05**	-0.14**	-0.01	-0.05**	-0.01
Thomas B. Fordham Foundation	0.07**	0.04**	0.08**	0.03	0.19**	0.10**	-0.07**	0.04**	0.09**	0.04**

Table 9: Portfolios of Largest Authorizers by Location

Name of Authorizer	Number of Schools			
	Urban	Suburban	Town	Rural
Ashe Culture Center	8	2	0	0
Buckeye Community Hope Foundation	34	6	0	0
Educational Resource Consultants of Ohio	25	3	0	0
ESC of Central Ohio	7	0	0	0
Kids Count of Dayton, Inc.	9	2	0	0
Lucas County ESC	50	14	1	1
Ohio Council of Community Schools	46	3	0	1
Richland Academy	13	0	0	0
St Aloysius Orphanage	39	4	0	0
Thomas B. Fordham Foundation	7	0	3	0

A second analysis was conducted to examine if authorizers' ability to provide monitoring and oversight is affected by the size of their individual portfolios, location, or a combination of size and location. "Small authorizers" are defined as authorizers who oversee four or fewer schools during that growth period, "medium authorizers" are defined as authorizers who authorize between five and 19 schools in a school year and "large authorizers" are authorizers who authorize 20 or more schools during a given year. Since the number of schools a given authorizer oversees can change from year to year, classification of authorizer size was performed by growth period. For example, if an authorizer was "small" in 2009, growth values for those students were included in the small group. If the same authorizer added schools to their portfolio in 2010 and was classified as a "medium" authorizer, student growth values would be grouped with the medium authorizers for that year. Despite some authorizers moving across groups during the years of study, most authorizer portfolios remained relatively stable over the course of the growth periods.

Table 10: Impact of Authorizer Size and Location on Student Learning

Authorizer Size by Location	Reading	Math	Number of Observations	School Counts			
				2009	2010	2011	2012
Small Urban	0.04**	0.04**	5217	13	20	16	11
Small Suburban	-0.03	0.10**	838	6	6	9	5
Small Town	-0.21**	-0.27**	1521	6	10	9	10
Small Rural	-0.03	-0.15**	639	6	6	3	4
Medium Urban	0.04**	-0.01	7692	13	15	14	14
Medium Suburban	-0.03	-0.08**	286	2	1	2	1
Medium Town	-0.06**	-0.08**	534	1	2	2	2
Medium Rural			2	0	0	0	1
Large Urban	-0.02**	-0.04**	42014	72	66	73	76
Large Suburban	0.01	-0.01*	8630	18	17	12	14
Large Town	-0.12**	-0.24**	1154	1	1	1	0
Large Rural	-0.05**	-0.13**	12803	1	2	0	1

Not surprisingly, the largest portion of student growth observations come from urban areas and, specifically, charter students in urban areas enrolled in large authorizer schools. There are fewer charter students and charter schools in towns and rural areas. Charter schools in towns and rural areas are more likely to have a small authorizer than a medium or large authorizer. This means that most charter schools in rural areas and towns are likely to have an authorizer that has four or fewer schools in their portfolio.

Upon examination of Table 9, no one type of authorizer (small, medium, or large) stands out as having stronger or weaker educational gains as a composite. However, the variability of academic progress by location is evident. Small, medium, and large authorizers all have greater academic progress in urban and suburban areas than in towns and rural areas. The greatest amount of variability in learning gains happens with authorizers with small portfolios. Charter students in urban and suburban schools overseen by small authorizers have the strongest academic growth, but charter students in towns and rural areas overseen by small authorizers have the largest deficits in academic growth. Large authorizers also have very negative growth values in towns and rural areas. Thus, authorizers' ability to provide monitoring and oversight does not appear to be a function of the size of their individual portfolios, but rather the location of the schools in the portfolio.

It seems that small authorizers that operate schools in urban and suburban areas differ significantly in their ability to provide monitoring and oversight from the authorizers that are responsible for monitoring and providing oversight to schools in towns and rural areas, the former being considerably better than the latter in this capacity. The discrepancies in performance within the large authorizer group appear to be related to a difficulty to providing oversight to schools that differ, in many ways, from the (urban) schools that make up the majority of their portfolios. More research is necessary to understand the factors that impact authorizers' ability to provide monitoring and oversight.

The final authorizer analysis included in this report is an analysis of the performance by the type of authorizer. Four authorizers included in the analyses belong to the HEI category, 56 authorizers belong to the LEA category, and six authorizers are classified as NFP. Most of the "small" authorizers are Local Education Agencies and six of the 10 largest authorizers are Not-for-Profit. The first two columns display the results for each type of authorizer for both reading and math. The following columns display the academic growth results for type of authorizer and size of the authorizer within that type.

Students attending charter schools authorized by the State of Education Agency lag the furthest behind their TPS virtual peers of all authorizer types. This result is not unexpected because state agencies are often the authorizers of "last resort", as they take over the lowest performing schools.

HEI authorizers post the second lowest academic gains. The small HEI authorizers tend to have better results than the large HEI authorizers. The explanation for this pattern of results may be related the approach HEI authorizers take toward monitoring and overseeing schools as well as the financial constraints related to higher education. Institutions of higher education often view school authorization as a charitable act and not a way to make money. Additionally, higher education institution employees trade academic freedom for lower salaries. The philosophy of charity over economic gain and (possible) lower salaries for teachers and leaders in HEI-authorized schools likely contributes to lower academic growth for students in charter schools.

Charter students in LEA and NFP authorized schools tend to have stronger academic performance overall and across the size of the authorizer portfolios¹⁴. The strength of LEA performance may be attributed to a high level of knowledge about education needs of communities to which the schools in their portfolios belong. The

¹⁴ The exception here is NFP small authorizers. This category is occupied by a single authorizer and three schools for two of the academic years examined.

educational performance associated with NFP authorizers, particularly with medium and large authorizers, is likely affected by knowledge of the educational needs of the schools (and communities) they service as well as a better ability to finance, monitor and oversee a larger number of schools.

Table 11: Impact of Type and Size of Authorizer

Name of Authorizer	2009-2012		Small		Medium		Large	
	Reading	Math	Reading	Math	Reading	Math	Reading	Math
Higher Education Institution	-0.04**	-0.09**	-0.03*	-0.05*	--	--	-0.04**	-0.09**
Local Education Agency	-0.02**	-0.04**	-0.02*	-0.05**	0.03*	0.01	-0.02**	-0.04**
Not-for-Profit	-0.01**	-0.03**	-0.15**	-0.18**	0.03**	-0.02**	-0.02**	-0.03**
State Education Agency	-0.17**	-0.11*	--	--	-0.17**	-0.11*	--	--

Synthesis and Conclusions

Over the six years from the 2007-2008 school year to 2012-2013, the typical charter school student in Ohio had less learning in a year than his or her TPS counterpart. The difference in learning amounts to just over 14 days in reading and 43 days in math. The learning gains for charter school students rose slightly over the five growth periods included in the study, suggesting a continuing trend of improvement.

The overall results, however, mask important differences when comparing different groups of schools. Of particular interest are the results when students are clustered geographically. Town and rural charter students have dramatically worse academic progress than their peers in local district schools. The differences are on the order of about seven fewer months of learning in charter schools. The study is not able to confirm the reasons for these dramatic gaps in learning, but many appear to involve single charter schools authorized by a local education agency (LEA).

Suburban and urban charter school students post equivalent learning gains that are slightly better than the state overall performance. In Ohio, 68 percent of the state's charter school population attends urban charter schools, which also represent the fastest growing segment of charters. Therefore, the performance of urban charters holds distinct and special interest. There is an encouraging trend in the performance of urban charter students, suggesting that efforts to increase charter school quality are beginning to pay off. It bears mention, however, that there is considerable variation across cities in Ohio in the caliber of their charter school results. The study featured deeper examination of charter results in Cincinnati, Cleveland, Columbus, and Dayton; only charter school students in Cleveland have higher achievement than their TPS peers. Cleveland charter students have a 14 day learning advantage in both math and reading. Students in other cities had results that were at best on par with, and often lagged behind, those found for their TPS peers.

Other groups of students also showed advantageous outcomes compared to their TPS comparisons. Students in poverty and particularly Black students in poverty have greater academic progress in charter schools compared to the same groups in traditional public schools. The finding did not hold for Hispanic students in general or the subset of Hispanic students who are in poverty. These state-wide findings are likely propelled by Cleveland and Columbus where Black students in poverty attending charter schools markedly outpace Black students in poverty who attend traditional public schools. The findings are of note considering that three-quarters

of Ohio's charter school students are in poverty, and over 53 percent of students in urban charter schools are both Black and in poverty¹⁵.

Two other student groups receive much attention in discussions about charter schools: English Language Learners and students with Special Education needs. Interestingly, Ohio charter schools enroll the same proportion of these student types as the district schools nearby and as the state as a whole, which is uncommon in the states we have studied to date. For English Language Learners, enrollment in charter schools carries no significant benefit; their academic progress is less than native speakers, regardless of whether they attend TPS or charter schools. The difference between the sectors for English Language Learners is not significant. A different picture was revealed for Special Education students. The majority of Special Education students in Ohio charter schools have smaller gains than their TPS peers, with one notable exception: in Dayton, these students on average gain 166 additional days of learning in reading and 180 days in math compared to their TPS Special Education peers. The difference is so striking that it warrants further inquiry to identify practices that might be disseminated elsewhere.

The findings of the “school-types” (i.e. elementary, middle, high and multi-level schools) analyses revealed that, while charter students have lower achievement overall compared to TPS students, charter students in middle school outperform their peers in TPS in both math and reading. Achievement for charter students in elementary schools does not differ significantly from elementary students attending TPS. Charter students attending high and multi-level schools perform markedly worse (an average of 39 days of learning behind in reading and 72 days in math) than students attending TPS high and multi-level schools. The pattern of results implies that charter students attending high schools and multi-level schools are driving the TPS/charter achievement gap in Ohio.

Across the state, students in Charter Management Organizations (CMOs) have academic gains that are smaller than students who enroll in single charter schools, which in turn lag behind their TPS peers. The one bright spot is found in CMO middle schools, where CMO-schooled students have comparatively larger gains than their independent charter school peers. There are isolated CMO organizations that create strong and positive results for their students, but the typical student does not enjoy superior academic progress by attending an Ohio CMO-affiliated school.

When school-level academic performance is considered, nineteen percent of Ohio charters outpace the learning impacts of TPS in reading, and 27 percent do so in math. In Ohio, 18 percent of charter schools perform worse than their TPS markets in reading and 23 percent of charter schools perform worse than their TPS

¹⁵ Based on the students in our sample

markets in math. The market comparisons within the cities align closely with the state of Ohio overall, with the exception of Cincinnati where 50 percent of charter schools perform worse than TPS schools in their markets with respect to math.

The student-to-student and school-to-school results show charter schools to be either behind or on par, respectively, with TPS. The larger question of whether charter schools are helping students achieve at high levels is also important. Ninety-three percent of charter schools in Ohio fall below the 50th percentile in achievement in math and 73 percent of charters fall below the 50th percentile in achievement in reading. A total of 44 percent of Ohio charter schools have below-average growth and below-average achievement in reading, and the same is true for 48 percent of the charter schools in math. The number of schools that have below-average growth and below-average achievement are a source of great concern in Ohio. Students in these schools will not only have inadequate progress in their overall achievement but will fall further and further behind their peers in the state over time.

The share of underperforming charter schools is partially offset, however, by the proportion of charter schools that are either already achieving at high levels or are positioned to reach those levels. In Ohio, 79 charter schools (53%) have positive academic growth in reading and 74 (50%) have positive academic growth in math (irrespective of achievement). Of the schools below the 50th percentile of achievement, just under half have positive growth in reading and math. Should these trends continue, the share of schools that currently lag behind the state average for absolute achievement would be expected to decline.

Authorizers in the state of Ohio vary in their ability to provide monitoring and oversight to the schools in their individual portfolios. The ability to monitor and oversee schools does not seem to be a function of the size of the authorizer (the number of schools in a portfolio), but a function of location of the school(s) that are authorized. Charter students in schools monitored by small authorizers have the lowest academic gains, leading one to question why performance is so troubling in these areas. Analyses of authorizer type show that charter students of NFP and LEA authorizers have better academic progress when compared to their TPS virtual twins than charter students in schools authorized by HEIs and the SEA. These results can likely be attributed to the amount of knowledge of the academic needs of the schools the authorizer monitors and supervises and the financial resources available to staff schools in their portfolios.

Conclusions

Four main conclusions emerge from a synthesis of the preceding summary of results. First, recent efforts across Ohio to improve the quality of charter school performance are only dimly discernible in the analysis. Overall performance trends are marginally positive, but the gains that Ohio charter school students receive even in the most recent periods studied still lag the progress of their TPS peers. More work is needed to ensure that charter schools are serving their students well.

Second, high growth areas for charter schools (the overlapping categories of urban schools and schools working with Black students in poverty) offer the best comparative performance for charter school outcomes. Thus, efforts to enhance performance and expand the supply of these charter schools must focus on how well students progress each year. Strong examples of high performance do exist in Ohio; these schools have designs, staff recruiting practices, and operations management that could offer important lessons to other operators.

Despite exemplars of strong results, over 40 percent of Ohio charter schools are in urgent need of improvement: they both post smaller student academic gains each year *and* their overall achievement levels are below the average for the state. If their current performance is permitted to continue, the students enrolled in these schools will fall even further behind over time. The long-term prospects for their students dim with every year they remain in these schools.

Ensuring academic performance is a responsibility shared among the charter school leaders, the charter school Boards of Directors, and the charter school authorizer who grants and oversees the school. The picture of authorizing in Ohio revealed by this study shows some strong examples in every category of authorizers. Size of the portfolio does not appear to matter. However, there appears to be a willingness by some LEA authorizers to allow poor performers to remain open over long periods of time. Enumerating the reasons for this practice is beyond the scope of this study. However, the pattern is clear and needs more attention.

More research is needed to better understand the organizational factors that explain the performance patterns revealed in this authorizer analysis. Among the several plausible hypotheses, a basic question would be whether deep institutional memory in the form of long-tenured staff affects performance. In the alternative, the question of systematized policies and procedures might make authorizers less vulnerable to personnel changes and sustain focus on performance as teams evolve.

Charter school Boards of Directors also need self-reflection and improvement. The question naturally arises about the efficacy of the Boards of the low-growth / low-achievement charter schools: what do they actually know about their schools' results and what are they doing to address such poor performance? As with any public school, the Boards have a legal and fiduciary responsibility to manage the performance of the school. Moreover, they are or ought to be in closer and more regular contact with school leaders to have a better chance to gaining "on the ground" knowledge of school performance.

Perhaps the most encouraging conclusion about charter schools in Ohio is that progress is already underway. State legislative and Ohio Department of Education regulatory changes were implemented during the years of this study and continue to evolve. The changes have emphasized academic quality as a priority, and discretionary resources have been tied to operating requirements that move schools to higher levels of autonomy and discretion. With continued attention and commitment, more of Ohio's charter school students will receive the education they need to become successful future citizens in Ohio, the US, and across the globe.

Tables 12 and 13 present a summary of the results.

Table 12: Summary of Results

	Reading	Math
Ohio Charter Students	Negative	Negative
Cincinnati		Negative
Cleveland	Positive	Positive
Colombus		Negative
Dayton		
Charters in 2009	Negative	Negative
Charters in 2010		Negative
Charters in 2011	Negative	Negative
Charters in 2012	Negative	Negative
Charters in 2013	Negative	Negative
Urban Students	Negative	Negative
Suburban Students		Negative
Rural Students	Negative	Negative
Town Students	Negative	Negative
Elementary Charter Schools		Negative
Middle Charter Schools	Positive	Positive
High Charter Schools	Negative	Negative
MultiLevel Charter Schools	Negative	Negative
First Year Enrolled in Charter School	Negative	Negative
Second Year Enrolled in Charter School		Negative
Third Year Enrolled in Charter School	Positive	Positive
Fourth Year Enrolled in Charter School	Negative	
Black Charter School Students	Negative	Negative
Hispanic Charter School Students	Negative	Negative
Charter School Students in Poverty	Negative	Negative
Black Charter School Students in Poverty	Negative	Negative
Hispanic Charter School Students in Poverty	Negative	Negative
Special Education Charter School Students	Negative	Negative
English Language Learner Charter School Students	Negative	
Charter CMO	Negative	Negative
Charter Non-CMO	Negative	Negative
Charer CMO Elementary Charter Schools	Negative	Negative
Charter Non-CMO Elementary Charter Schools	Positive	Positive
Charer CMO Middle Charter Schools	Positive	Positive
Charter Non-CMO Middle Charter Schools	Positive	Positive
Charer CMO High Charter Schools	Negative	Negative
Charter Non-CMO High Charter Schools	Negative	Negative
Charer CMO Multilevel Charter Schools	Negative	Negative
Charter Non-CMO Multilevel Charter Schools	Negative	Negative

Table 13: Summary of Statistically Significant Findings by City

	Reading	Math
Black Charter School Students		
Cincinnati	Negative	Negative
Cleveland	Negative	Negative
Colombus	Negative	Negative
Dayton	Negative	Negative
Hispanic Charter School Students		
Cincinnati		
Cleveland	Negative	Negative
Colombus		Negative
Dayton		
Charter School Students in Poverty		
Cincinnati	Negative	Negative
Cleveland	Negative	Negative
Colombus	Negative	Negative
Dayton	Negative	Negative
Black Charter School Students in Poverty		
Cincinnati	Negative	Negative
Cleveland	Negative	Negative
Colombus	Negative	Negative
Dayton	Negative	Negative
Hispanic Charter School Students in Poverty		
Cincinnati	Negative	
Cleveland	Negative	Negative
Colombus	Negative	Negative
Dayton		
Special Education Charter School Students		
Cincinnati	Negative	Negative
Cleveland	Negative	Negative
Colombus	Negative	Negative
Dayton		
English Language Learner Charter School Students		
Cleveland		Negative
Colombus	Negative	Negative

Appendix

The numbers in the tables below represent the number of charter observations associated with the corresponding results in the report. An equal number of VCRs were included in each analysis.

Appendix Table 1: Number of Observations for All Results

Student Group	Matched Charter Students	
	Reading	Math
Ohio Charter Students	95,257	96,628
Students in Cincinnati	7,504	7,599
Students in Cleveland	9,573	9,747
Students in Columbus	15,625	15,644
Students in Dayton	3,459	3,436
Students in Charters in 2009	14,842	15,047
Students in Charters in 2010	18,918	19,039
Students in Charters in 2011	20,692	21,239
Students in Charters in 2012	19,980	20,211
Students in Charters in 2013	20,825	21,092
Students in Urban Schools	64,271	65,373
Students in Suburban Schools	11,730	11,822
Students in Town Schools	3,698	3,767
Students in Rural Schools	15,372	15,468
Students in Elementary Schools	44,441	44,981
Students in Middle Schools	8,781	9,044
Students in High Schools	3,041	3,184
Students in Multi-level Schools	38,806	39,220
Students First Year Enrolled in Charter School	20,710	21,145
Students Second Year Enrolled in Charter School	5,933	6,006
Students Third Year Enrolled in Charter School	1,949	2,001
Students Fourth Year Enrolled in Charter School	432	434
Black Students	49,367	50,000
Hispanic Students	3,125	3,270
White Students	40,147	40,569
Students in Poverty	70,350	71,472
Black Students in Poverty	43,653	44,118
Hispanic Students in Poverty	2,675	2,805
Special Education Students	7,379	7,745
English Language Learners	230	270
Grade Repeating Students	446	615

Appendix Table 2: Starting Deciles in Ohio

Student Group	Matched Charter Students	
	Reading	Math
Students in Decile 1	16,033	17,505
Students in Decile 2	12,662	16,468
Students in Decile 3	11,947	14,166
Students in Decile 4	10,600	12,219
Students in Decile 5	10,964	9,971
Students in Decile 6	9,352	7,857
Students in Decile 7	8,637	7,473
Students in Decile 8	7,556	5,226
Students in Decile 9	4,516	3,542
Students in Decile 10	2,990	2,201