



Trends in Third Grade Reading Proficiency

An Analysis of DC CAS Results (2007-2014)

Executive Summary

The early elementary grades are a critical time for students to develop the academic and developmental building blocks they will need to succeed in school. In particular, learning to read proficiently by the end of third grade is one of the best predictors of a student's later academic success.

Our analysis of DC CAS scores found that third grade reading proficiency did not improve for students citywide between 2007 and 2014. Additionally, we found a statistically significant decline in reading scores for economically disadvantaged and black third graders. We also found that economically disadvantaged third graders attending schools with high concentrations of poverty scored significantly worse on the reading assessment than those attending more economically integrated schools.

Given the results of this analysis and the body of research demonstrating the importance of mastering reading by the end of the third grade, District leaders must reexamine how resources are allocated and prioritized starting at birth. To fully support literacy development, we must work to ensure the city's early childhood and elementary programs are both comprehensive and evidenced-based so that all children can develop the skills they need to succeed in school.

A growing body of research tells us that achieving proficiency in reading by the end of third grade is one of the best predictors of a

student's later academic success. This message has not been lost on educators and policymakers; as states and school districts seek to identify critical educational benchmarks, third grade proficiency has become the target of a broad range of policy interventions across the country.

In 2012, DC Action for Children released a policy brief examining the District of Columbia's progress in raising third grade math and reading proficiency. The brief found that despite a wide array of sweeping educational reforms under the DC Public Education Reform Amendment Act (PERAA) and the implementation of several policies intended to improve early reading ability, there was no statistically significant change to third grade math and reading proficiency between 2007 and 2011.¹ This report updates our analysis to include the final years the DC CAS was administered in DC,¹ providing both a richer data set and a more comprehensive look at how third grade students fared under PERAA.

From Learning to Read to Reading to Learn: Why Third Grade Proficiency Matters

The third grade represents an important juncture both in the way children learn and the way they are taught. During the first eight years of life, the human brain experiences its most rapid growth and is most malleable to environmental influences. Since this cognitive development occurs cumulatively, with later growth building on top of existing abilities, the

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¹ For the 2014/2015 school year, the DC CAS was replaced by the Partnership for Assessment of Readiness for College and Careers (PARCC), a standardized assessment based on the Common Core standards that is being adopted in a number of school districts across the country. Because of the differences in psychometric properties between these two assessments, it will not be possible to compare the new PARCC results with old DC CAS results.

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first eight years of learning are critical for future success.² Similarly, early elementary grades focus on developing foundational knowledge in literacy, math, and reasoning that are essential for success when students encounter more complex content later in their schooling. As a result, it is critical for students to develop the academic building blocks of core subject material by the time they finish the third grade.

The importance of the third grade as a benchmark for success is more than just theory or conjecture: a large-scale, longitudinal study released in 2012 by the Annie E. Casey Foundation found that students who do not read proficiently by the end of the third grade are four times less likely to graduate high school. These effects are compounded for children in impoverished families and those living in neighborhoods with high concentrations of poverty—two findings that carry significant weight for many children in the District. Failing to graduate from high school can have serious consequences for one’s life outcomes, limiting employment opportunities, lowering earnings and increasing the likelihood of poor health and criminal activity.³

Data and Limitations

This policy brief analyzes school-level DC CAS results, which are reported on a four-tiered scale: Below Basic, Basic, Proficient and Advanced. While DC CAS results are often expressed in terms of the percent of students scoring proficient or above—an easy way to gauge a school’s performance at a glance—this method would not capture an improvement in a student’s score from one year to the next, such as an increase from Below Basic to Basic or Proficient to Advanced. To get a more nuanced picture of the data, we use a weighted proficiency formula,ⁱⁱ which assigns each proficiency level a value between 1 and 4: a weighted proficiency score of 1 would mean all students scored Below Basic and a weighted proficiency score of 4 would mean all students scored Advanced. In this update, two types of statistical

analysis were used to determine whether trends in reading proficiency scores between 2007 and 2014 were statistically significant. Since third grade reading proficiency, in particular, is associated with improved outcomes, this update will focus on trends in reading performance, looking particularly at how race/ethnicity, socioeconomic status, and school sector are associated with student success.

There are two primary limitations for this analysis. First, since publicly available DC CAS results are reported at the school level, the depth of the analysis possible is inherently restricted. For example, we know that the District is undergoing significant demographic changes, but without student level data it is not possible to control for the differences in student characteristics between different third grade cohorts or between student subgroups. Second, while the weighted proficiency formula is an improvement over an analysis of the percent of students scoring proficient, it is not able to capture the fine-grained changes between the upper and lower bounds of each of the tiered proficiency levels. In an ideal world, access to the raw test results, at the student level, would allow for a more thorough analysis and understanding of the results. For

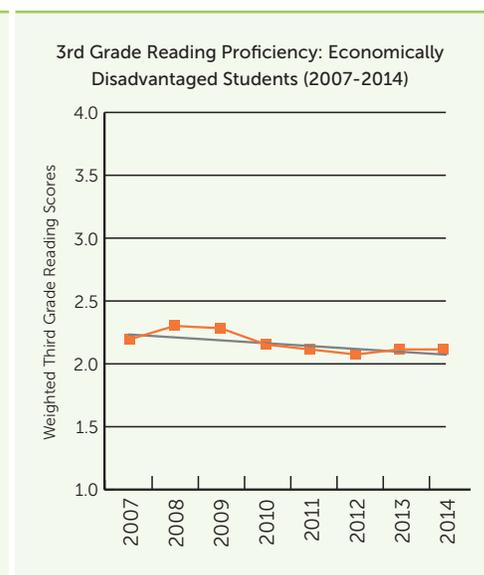
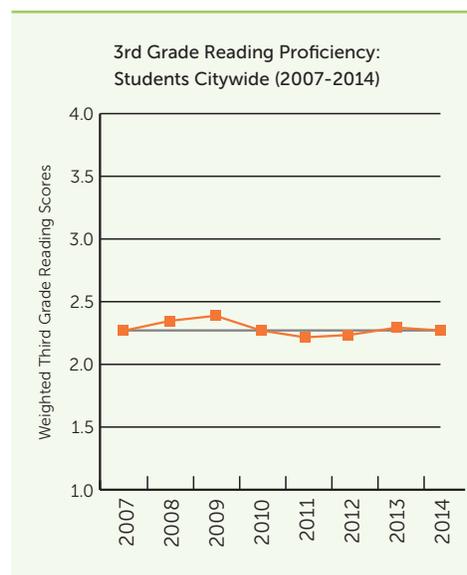
more information about the data and methodologies used in this analysis, please see the appendix.

Results: Third Grade Reading Proficiency in the District Today

Third grade reading proficiency in the District has not improved between 2007 and 2014. In fact, our analysis indicates that there was actually a slight downward trend in reading proficiency between 2007 and 2014. However, while this change was statistically significant, it was small enough that it was not substantively meaningful. Our update confirms our finding from the original 2012 publication: the reading proficiency of third graders citywide has not improved since the passage of PERAA.

Economic Disadvantage and Proficiency

In the District, the poverty rate for public school students is high: 66 percent of all DCPS and public charter students are eligible for free and reduced price meals (FARMs), a common proxy measure for student poverty. A closer look at DC CAS results sheds additional light on the role that poverty plays in constraining a student’s academic potential. In 2014, only 34 percent of economically disadvantaged third-grade students tested proficient or above in reading. By contrast, nearly 78



ⁱⁱ The weighted proficiency formula was created for our original third grade analysis in partnership with the Elder Research Group, who assisted with the quantitative analysis.

Our analysis of weighted reading proficiency scores suggests a sobering trend: the proficiency rates of black third-grade students have actually declined over these years, while they have risen for white students.

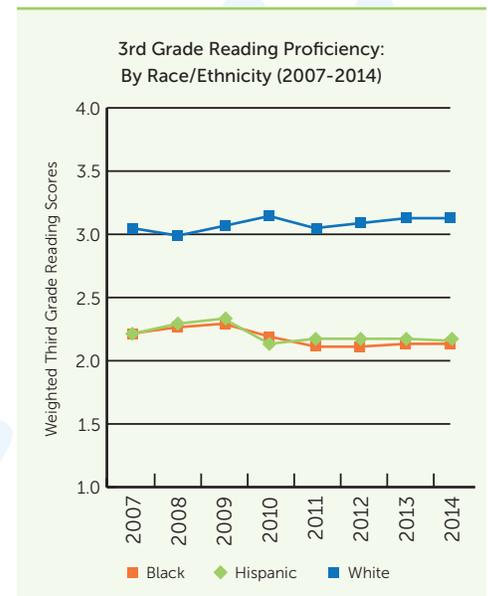
percent of the students not designated as economically disadvantaged scored proficient or above on the same test. This gap provides a striking illustration of how the unequal distribution of resources can shape a child's educational opportunities. While this gap is significant, recent changes in the way DCPS calculates and reports FARMs eligibility suggest that this gap may be even larger.ⁱⁱⁱ Our analysis of DC CAS results between 2007 and 2014 found a statistically significant downward trend in reading proficiency for economically disadvantaged third grade students.

Racial and socioeconomic segregation in the District over many years has led to highly concentrated poverty in many of the city's neighborhoods. For example, nine of the ten neighborhood clusters with the highest poverty rates are east of the Anacostia River in Wards 7 and 8.⁴ This socioeconomic segregation is especially prevalent in the city's public schools, which can further compound the disadvantages faced by students living in poverty at home. Schools with a high percentage of the student body living in poverty have higher teacher turnover rates and less qualified teachers, on average, than schools with a larger percentage of middle or upper-class students.⁵ Research suggests that a school's socioeconomic makeup may have as much impact on students' academic growth over time as their individual economic status⁶ and that low-income students attending low-poverty schools perform substantially better academically than those in schools with high concentrations of poverty.⁷ Our analysis of third grade reading proficiency in the District supports these findings. We found that economically disadvantaged students attending schools with lower concentrations of economically disadvantaged students outperformed those in high-poverty schools. On average, economically

disadvantaged third graders who attend a DCPS or PCS school where 25 percent of the student body is economically disadvantaged scored more than one standard deviation higher on their third grade reading assessment than economically disadvantaged students who attended schools where all students were economically disadvantaged — a score higher than the citywide average for all students.

Race/Ethnicity Proficiency

While race/ethnicity itself does not influence academic achievement, it is deeply connected with socioeconomic status and opportunity in the District, where the racial achievement gaps are some of the widest in the country. Indeed, while 94 percent of white third grade students tested proficient or above in reading in 2014, the same was true for only 35 percent of black third graders and 36 percent of Hispanic third graders. Our analysis of weighted reading proficiency scores suggests a sobering trend: the proficiency rates of black third-grade students have actually declined over



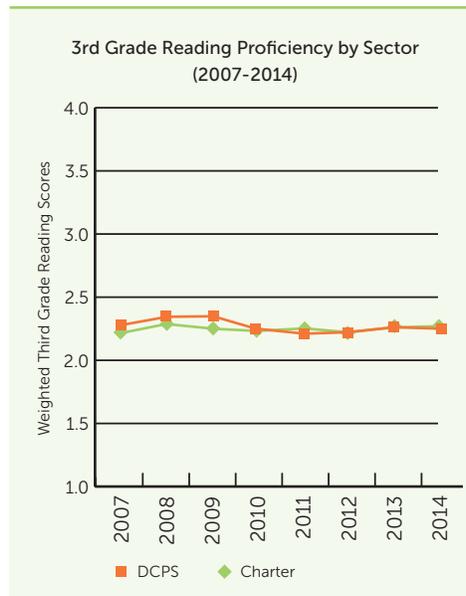
ⁱⁱⁱ In 2013, DCPS began participating in a federal program that allows schools to extend eligibility for free and reduced meals to all students at high poverty or 'high need' schools without determining the eligibility of individual students. While this measure reduces the administrative burden on schools, and helps ensure that more low-income students have access to meals at schools, an undetermined number of higher income students are now classified as 'economically disadvantaged' as a result. This change in the way schools classify economically disadvantaged students has likely inflated the average DC CAS results in 2013 and 2014 for economically disadvantaged students as a whole.

these years, while they have risen for white students. While Hispanic proficiency scores appeared to decline, our analysis did not find statistically significant evidence of this trend. Taken together, these results indicate that the racial literacy gap between black and white third graders in the District may have actually increased over the last eight years.

School Sector

There is much debate around whether attending a charter or traditional public school leads to different academic outcomes for students.^{iv} One common finding in much of the rigorous research on the subject has been that a wide range of school quality can be found in both charters and traditional public schools.⁸ This holds true in the District, as schools performing well above, and below, the city's average can be found in both DC public schools and DC public charter schools. In 2014, both sectors had a similar reading proficiency rate: 43 percent for DCPS and 45 percent for charter schools. However, our analysis of weighted reading proficiency scores indicates a statistically significant downward trend in reading proficiency for DCPS students but no trend for charter students.

A closer look at the data suggests that economically disadvantaged third graders in charter schools are performing better at reading than those in DC public



schools. Forty-one percent of third graders in public charter schools tested proficient in reading in 2014, compared to only 29 percent of DCPS third graders. Our analysis of DC CAS results indicates a downward trend in reading proficiency for economically disadvantaged DCPS third grade students between 2007 and 2014, but we failed to find a statistically significant trend in reading proficiency for economically disadvantaged charter school students over the same time. We are unable to determine whether the difference in the performance of economically disadvantaged students between school sectors is the result of

differences in the quality of education provided or other factors.

Moving Forward

Today, more than half of the city's third graders are still not proficient in reading, making it clear that we have not made the necessary progress to give the city's young students the tools they need to succeed in school and later in life. For those who work to improve the lives and outcomes of the District's children—whether in the school system, the city government, or nonprofit sector—the lack of significant gains in reading proficiency should be cause for serious reflection. While living in or near poverty is undeniably a major barrier to academic achievement for many of the District's students, we can, and must do better. The city invests significant resources in its universal pre-kindergarten program, has adopted a series of accountability reforms and continues to have the highest per-pupil expenses in the country. However, as past research indicates, it is not necessarily how much is spent on education, but *how* it is spent. We must reexamine both how we allocate resources, from birth through graduation, to ensure we prioritize the evidenced-based programs that most benefit the District's students, and that social programs that deal with the effects of poverty are integrated with the city's schools.

^{iv} It is often difficult to untangle the effects of schools from selection bias; students who attend charter schools may differ in a number of ways from those who attend public schools that may not be readily observable, like parental involvement and student motivation.

¹ O'Keefe, B. (2012). Third grade reading proficiency in DC: Little progress. DC Action for Children. Retrieved from, https://www.dcactionforchildren.org/sites/default/files/3rd%20grade%20policy%20brief_FINAL.pdf

² Heckman, J. J. (2006). Skill formation and the economics of investing in disadvantaged children" *Science*, 213(5782),1900-1902. Retrieved from, http://jenni.uchicago.edu/papers/Heckman_Science_v312_2006.pdf

³ Hernandez, D. J. (2012). Double jeopardy: How third grade reading skills and poverty influence high school graduation. The Annie E. Casey Foundation. Retrieved from, <http://www.aecf.org/m/resourcedoc/AECF-DoubleJeopardy-2012-Full.pdf>

⁴ DC Action for Children, Data Tool 2.0 (2015). "Poverty Ratio". Retrieved from, <http://datatools.dcactionforchildren.org/>

⁵ Borman, G.D. & Dowling, N. M. (2008).Teacher attrition and retention: A meta-analytic and narrative review of the research. *Review of Educational Research* 78(3), 367-409.

⁶ Rumberger, R.W. & Palardy, G. J. (2002). The impact of student composition on academic achievement in southern high schools. The Civil Rights Project/ Proyecto Derechos Civiles. UCLA. Retrieved from, <http://escholarship.org/uc/item/3jq7r40z>

⁷ Schwartz, H. (2010). Housing policy is school policy: Economically integrative housing promotes academic success in Montgomery County, Maryland. *The Century Foundation*. Retrieved from, <http://www.tcf.org/assets/downloads/tcf-Schwartz.pdf>

⁸ Cremata, E., et al. (2009). National charter school study: 2013. Center for Research on Educational Outcomes (CREDO). Stanford University. Retrieved from, <http://credo.stanford.edu/documents/NCSS%202013%20Final%20Draft.pdf>



Appendix I: Methodology

This publication is an update to a 2012 report undertaken by the Elder Research Group on behalf of DC Action for Children. In order to maintain comparability, this update attempts to replicate the methodological approach undertaken by the authors of the original report as much as possible.

Data

This analysis employs data from the DC CAS test, provided by the Office of the State Superintendent of Education (OSSE). The test results are summarized at the school level and are reported on a four-tiered scale: Below Basic, Basic, Proficient, and Advanced. School-level results are further disaggregated by student subgroup including racial/ethnic categories and low-income status. Since the publication of the original report, OSSE has begun suppressing DC CAS results for school-level subgroups with less than ten students. In order to maintain consistency, the school-level results of student subgroups with less than ten students were removed from the analysis for the previous years.

For this update, we explore the differences in mean, weighted reading proficiency scores for all third grade public school students between the years 2007 and 2014 using linear regression and ANOVA tests. A weighting system was introduced to the data to provide more information in progress shifts over time in the four respective result categories. Every student's test score is weighted on the following scale: Below Basic-1, Basic-2, Proficient-3, and Advanced-4.

A school with students scoring all Proficient and none Advanced would receive a 3.0 where schools receiving all Advanced scores would receive a 4.0.

Analytic Approach

We explored changes in reading proficiency rates using least squared regressions and an *Analysis of Variance* (ANOVA).

After ordering the school level results by subgroup, a least squared error regression line was fitted over weighted scores for the eight years included in the analysis. The slope of the line is tested using a t-distribution to determine if the slope is different than zero. A p-value for each fitted line is subsequently reported to show the level of significance that the slope has. A slope with a p-value greater than .05 would indicate that there has not been a statistically significant change in average test scores over the eight-year period. Because there were only 5 years of data available for the original report, the authors determined that this approach had some inherent weaknesses by violating basic assumptions of the underlying approach.

As a back-up to this approach, ANOVA was used to test for the differences in data over time with a higher level of confidence using the year as a classifier and comparing the means of each year with every other year with the null hypothesis being that all years are equal. For this update, school-level weighted test scores for each subgroup by year, were compared in the ANOVA.

With ANOVA, a difference in just one year will give this test a significant result. If an ANOVA test is significant, in order to avoid a Type 1 statistical error, it is necessary to run a post hoc test to see how the years compare to each other. Since the original report did not clarify which post-hoc test it used, the Ryan Procedure (REGWQ) was employed in this analysis. REGWQ is a post hoc test for multiple comparisons that strikes a balance between the Tukey test's firm control over familywise errors and the statistical power of the Neuman Keul's test, thereby representing a balance between the risk of Type I and Type II statistical errors. It also accommodates the analyses with many pairwise comparisons.

Limitations:

The data provided has been summarized at the school level, which limits the questions that can be answered and reduces the level of confidence in the answers provided. For example, it was not possible to control for compositional changes in third grade cohorts, or for student demographic characteristics. Since student test scores are reported using the four-tiered scale, they are also not suited for capturing fine-grained changes between the upper and lower bounds of each proficiency level. The data and collection methods are not suitable to allow inferences about causes for the levels of or changes in proficiency. For future work, reporting the raw test results, at the student level, would allow for a more thorough analysis and understanding of the results.