Impact of the Stride™ Supplemental Program on ACT® Aspire® Test Scores in Alabama

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Data Analysis and Evaluation of the Stride™ Computer-Based Learning Program and its Impact on ACT Aspire Results for the Council for Leaders in Alabama Schools

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Executive Summary

The Council for Leaders in Alabama Schools (CLAS) has employed an adaptive multi-platform interactive learning platform in schools across the State of Alabama. Daggett, McNulty and Shulman (2015) found that the platform, called Stride™ by Fuel Education® (which includes interactive games and learning activities that dynamically adjust to the effort and performance of students who participate) was successful in raising test scores for participating students. In 2017, the Auburn Center for Evaluation was asked to analyze ACT Aspire data for students served by the program to answer this main research question: "To what extent is work in the Stride™ Program associated with differences in year-end Alabama State Accountability Assessments?"

To answer that question, a number of statistical analyses were employed, and the results suggest that the Stride™ program was successful during the 2014/2015 and 2015/2016 school years in improving academic achievement in targeted schools. This finding is in accord with a data analysis of the program done in 2011-12 by the Public Affairs Research Council of Alabama (PARCA), which found that students enrolled in the program "showed positive results in 8th Grade Math and Reading scores relative to their matched peers" (pg. 3).

Key Findings:

1. Stride™ students overall improved math benchmark pass rates by 15% compared to their demographically matched peers who improved pass rate by 8%.
2. For reading benchmarks, Stride™ students improved by 10% whereas their peers showed no statistically significant change.

3. Economically disadvantaged Stride™ students improved math pass rate by 23% whereas their peers showed no statistically significant change.

4. Students who are black and economically disadvantaged improved at a greater rate than their peers for math pass rate (23% vs. 10%) and reading pass rate (18% vs. 13%).

5. Students in Special Education improved reading benchmark pass rate by 57% compared to an improvement of 33% by their matched peers.

Limitations of the Evaluation

1. Data for the evaluation were completely dependent on the quality and quantity of information collected and reported by the ALSDE and LTS Systems.

2. Transience or mobility of the student population in participating schools is a concern. Comparisons made in the evaluation are based on the assumption that children in participating schools received the "treatment" of the Stride™ program, but a more extensive per-pupil analysis of student exposure to Stride™ and student mobility is necessary to fully understand this factor.

3. Intermediate and long-term shifts in knowledge, attitudes, perceptions, and achievements in reading may not have resulted from the Stride™ alone. Many schools in Alabama have multiple federal and state initiatives in effect at the same time (e.g. ARI, AMSTI, 21st Century Community Learning Centers, etc.). Since many of these initiatives are aimed at providing increased academic achievement, this may or may not have had an impact on student test scores.

4. Interpretations based on statistical significance alone should be made with caution.

Data and Method

The following analyses will seek to answer the research question: "To what extent is work in the CLAS Motivated Data Stride™ Program associated with differences in year-end Alabama State Accountability Assessments?"

To address this question, data were provided by LTS, now part of Fuel Education®, for school years 2014/15 and 2015/16 regarding each student engaged with the Stride™ program. Additionally, data were obtained from the Alabama State Department of Education (ALSDE) regarding student demographics for matching schools along with scores on each year's ACT Aspire. The Reading and Math assessments were used as they were the only two assessments completed by each demographic category, thus preventing data infidelity during analyses.

Previous research has utilized school pairings as the means to provide matched results. In order to build upon those findings, student-level pairings were generated. This method allows for comparing students of similar experiences across many additional areas than school-level pairings could allow. The theory driving this decision is that if school-level pairings found minimal significance regarding the relationship(s) between Stride™ engagement and State Accountability Assessments, then deeper level pairings will either confirm those findings with greater certainty or identify potential confounds.

A total of 8,519 students in Alabama schools in grades 3 through 7 at the end of 2015 and 4 through 8 at the end of 2016, who took the ACT Aspire Reading and Math tests at the end of each year were matched according to their collective demographic information. Reading and Math scores were used exclusively as these are the only scores taken annually. Including

additional tests would not have allowed for measuring year-to-year change. The variables included in order to create matches were: Local Education Agency (LEA), grade level, race/ethnicity (race), gender, free/reduced lunch (FRL) status, special education (SPED) status, and English language learner (ELL) status. After eliminating records that were inconsistent or could otherwise not be accurately matched with ACT Aspire scores, all remaining STRIDE™ students' data were used in the analyses but non-STRIDE™ students' data were only used if there was a match across all seven demographic measures. This resulted in 4,760 STRIDE™ students and 3,759 non-STRIDE™ students. There were a possible 960 variable combinations of which 768 actual combinations existed in the data. Students from the STRIDE™ dataset were first matched with their corresponding ACT Aspire scores and the records removed from the dataset to prevent duplication. Each of the previously mentioned variables were quantified and combined in order to give a unique identifier for each of the 768 combinations. Datasets were then combined, pairing the "No STRIDE™" and "Yes STRIDE™" groups.

This method of group pairing was chosen in order to limit extraneous variation associated with differential experiences due to different variable combinations across LEAs. It ensures similar learning environments, school structure (e.g., same grade levels per school, etc.), and that the cultural and economic differences would be contained within a similar context (i.e., controlling for the effects of cost-of-living differences). This method is preferable to comparing STRIDE™ students with the state population as using the whole population would more closely measure school differences instead of differences associated with STRIDE™ participation. Ultimately, this study is able to examine how these individual students responded to STRIDE™ by comparing them to statistically similar students.

Table 1.

Number of participants associated with each primary demographic category.

	Total *N*	No Stride™	Yes Stride™
Overall	8,519	3,759	4,760
Black	3,187	1,393	1,794
Poverty	4,394	1,794	2,600
SPED	1,011	509	502

Analysis

Analysis of Variance (ANOVA) was utilized to address the research question. The preliminary model involved a full-factorial ANOVA with each demographic variable included so that main effects could be accurately identified and properly controlled. This initial model revealed main effects associated with grade, race, FRL, SPED, and LEA. A sensitivity analysis determined that LEA covaried with the interaction of FRL and race, thus it was excluded as a requisite control variable. The remaining four variables were included with the time variable to denote change and the predictor, Stride™ participation, to properly address the primary research question. Post hoc analyses were conducted as needed to elucidate the findings as they relate to the interaction of time with the predictor.

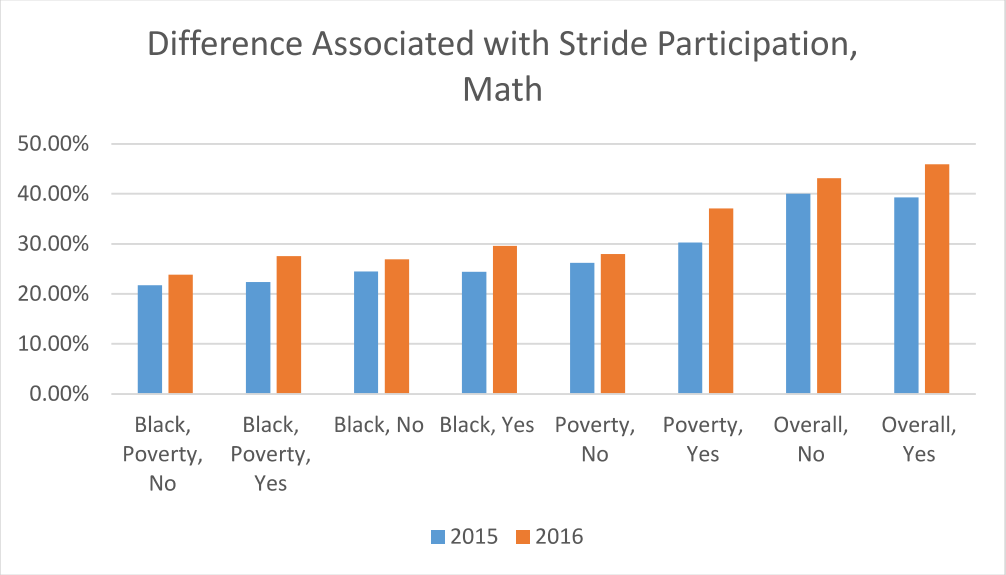
In order to address differential effects associated with other significant interactions, additional models were fit to the data by first isolating the variable in question, then fitting the factorial onto the remaining data.

Findings

The primary models addressing the research question produced significant interactions between the predictor and time for Reading ($F = 4.58$, $p = .032$) and Math ($F = 8.14$, $p = .004$). This coupled with post hoc analyses suggest that participation in Stride™ is associated with greater improvement on ACT Aspire Reading and Math Assessments when controlling for other significant predictors (FRL, race, SPED, and grade). Participation in Stride™ was associated with a year-to-year improvement of 6.62%-point as compared to 3.17% for Math and 3.76% compared to 1.12% for Reading.

Further examination identified a marked difference in standardized testing performance between racial majority (i.e., white) and minority (i.e., black) students as well as between those receiving free or reduced lunch and those who do not. Those in the more advantaged categories were more likely to achieve benchmark scores on both Math and Reading with or without Stride™. It is noteworthy that Stride™ participation was, actually, predictive of lower benchmark scores for white, non-poverty students, though continued participation was still associated with greater improvement. This is the only category in which the Stride™ group was significantly lower. As such, additional analyses were conducted to examine the benefit of Stride™ on disadvantaged groups. Students who are living in homes below 180% of the poverty line (FRL) showed significantly greater improvement in both Math (6.82% vs. 1.77%, $F = 12.77$, $p < .001$) and Reading (3.79% vs. 2.51%, $F = 6.58$, $p = .033$) when participating in Stride™. Students who are black who also participated in Stride™ showed greater improvement in Math (5.17% vs. 2.12%, $F = 4.12$, $p = .044$). Reading scores were not significantly more improved, but still follow the same trend (3.56% vs. 2.48%). Those who are both living in poverty and black showed improvement along the same trend, but did not reach significance. The same holds true

for those in SPED, with significant year-to-year improvement but Stride™ students did not improve significantly more. These results are summarized in the following bar graphs.



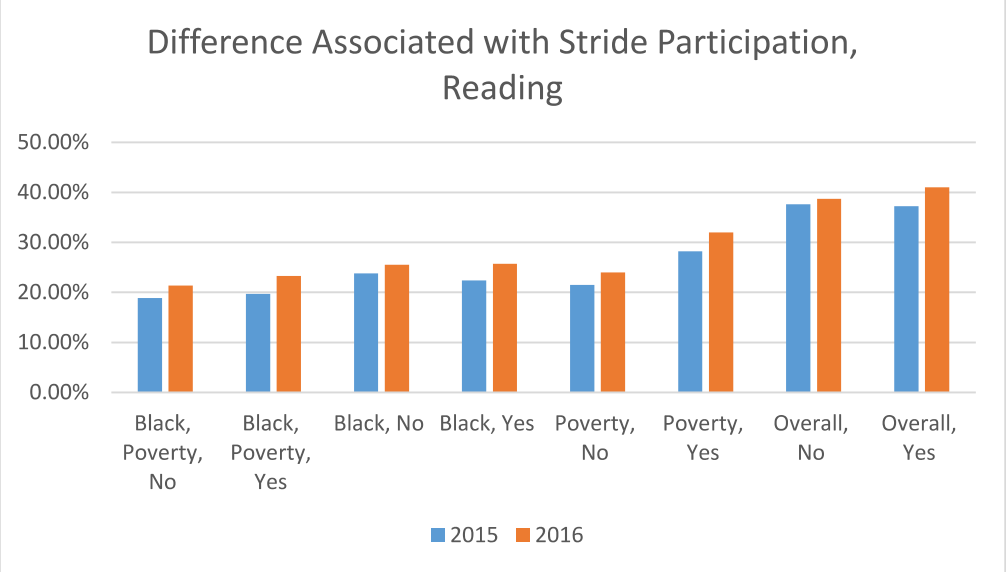


Table 1.

ANOVA table describing the difference in change in Benchmark Pass Rate associated with the interaction of Time with Stride™ Participation for Students Overall (N=8,519), Poverty (N=4,394), Black (N=3,187), and Black and Poverty (1,918).

		F	df	p
Math	Overall	8.14	8503	.004
	Poverty	12.77	4378	<.001
	Black	4.12	3171	.033
	Black and Poverty	3.54	1902	.060
Reading	Overall	4.58	8503	.032
	Poverty	6.58	4378	.033
	Black	2.91	3171	.088
	Black and Poverty	3.36	1902	.067

Discussion and Future Studies

Overall, the evidence provided in this report suggests that Stride™ is a valuable method of improving scores for any student. However, those with the most to gain appear to receive the greatest benefit from participation. The 3%-point increases for the overall student body and white, non-poverty students represent a relatively small increase in scores. While it is sure to be an appreciated benefit for those students, the 7%-point increase for those in poverty represents an additional 23% of those students achieving benchmark. Future work could examine the differences between in-school and out-of-school study habits for these populations to identify how best to serve them.

Grade level differences were also noted but are difficult to assign a true value due to breaking the established pairings. As noted above, benchmark scores increase each year. It would be inaccurate to conflate 4th grade scores from 2015 with 5th scores from 2016 even though they are the same students. As such, the appended graphs denote grade level differences for those who

previously engaged in Stride™ compared to those who did not, rather than by following consistent pairings. Future work would benefit from following students from their initial benchmark scores prior to Stride™ through their academic career to longitudinally study the effects of the program.

Finally, analyses were attempted regarding the incremental improvement that is likely to be associated with this type of program. While "total minutes engaged" was a significant variable, it was not able to be paired with non-Stride™ groups and it did not predict improvement beyond the scope of the control variables. Future work could utilize this along with incremental performance assessments to gauge the level of improvement throughout the year for those participating.

Summary

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References

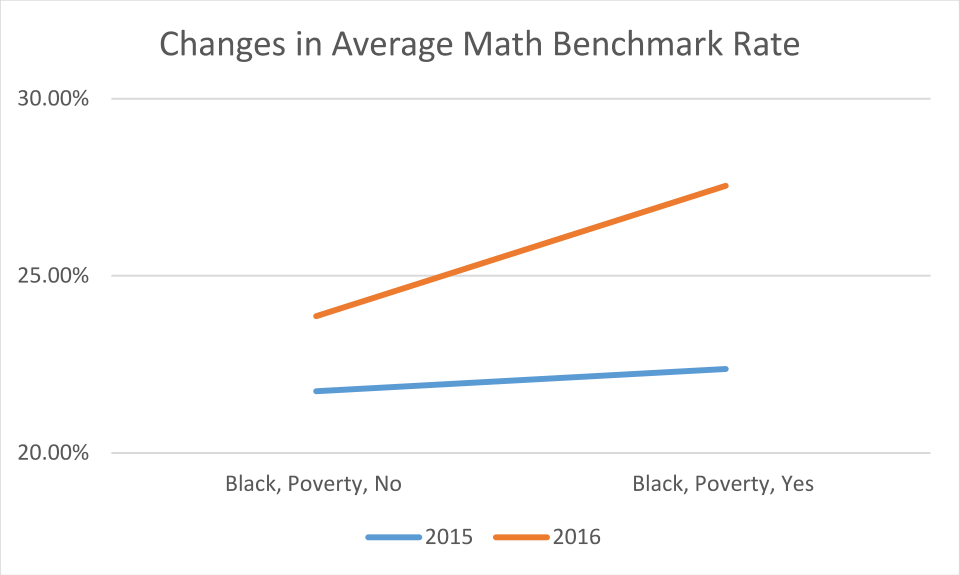
Adams, J. (2012). ANALYSIS OF LTS KIDS COLLEGE ARMT RESULTS FOR 2011 and 2012. Public Affairs Research Council of Alabama.

Daggett, W., McNulty, R., & Shulman, B. (2015). Digital based game learning. International Center for Leadership in Education.

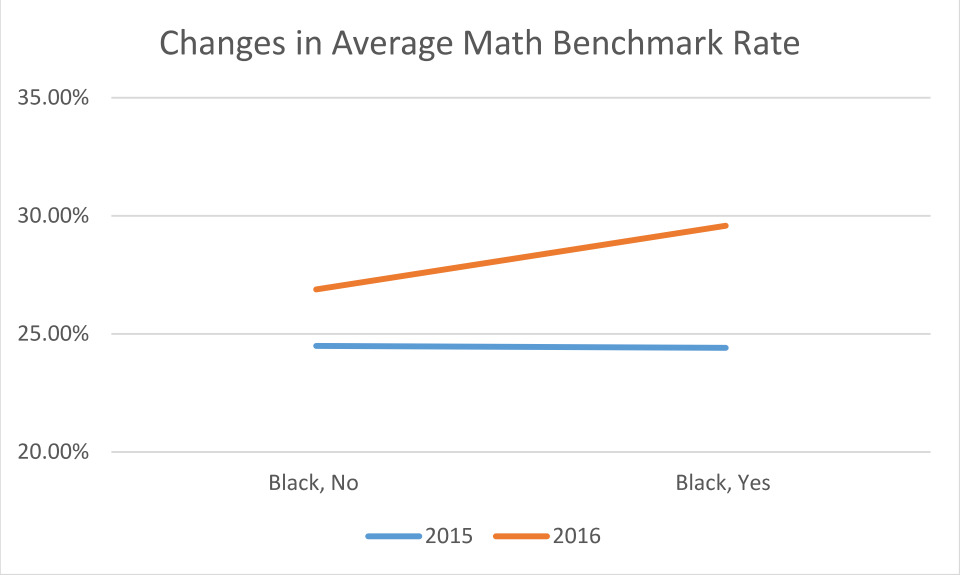
Appendix I

Percent of students passing the benchmark for Math

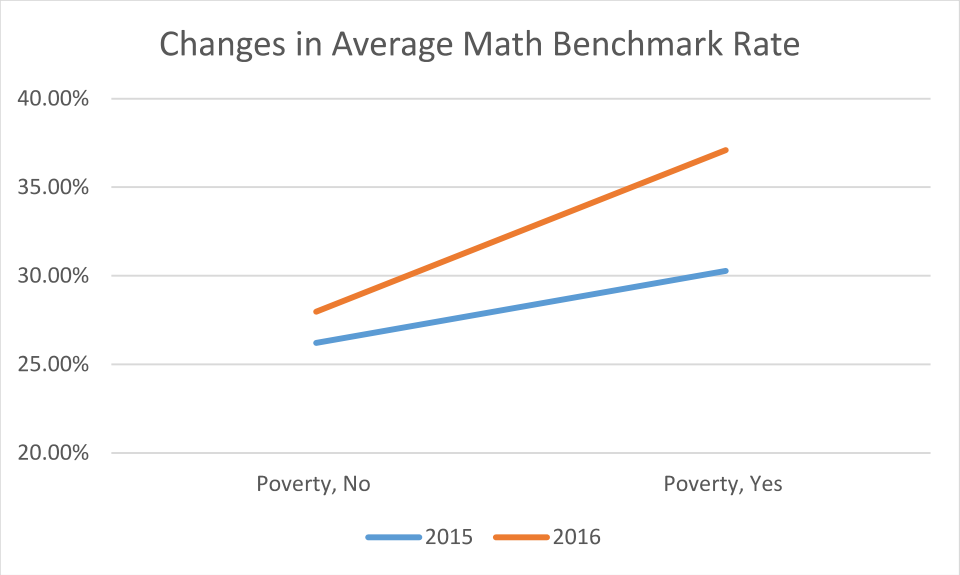
Black and Poverty



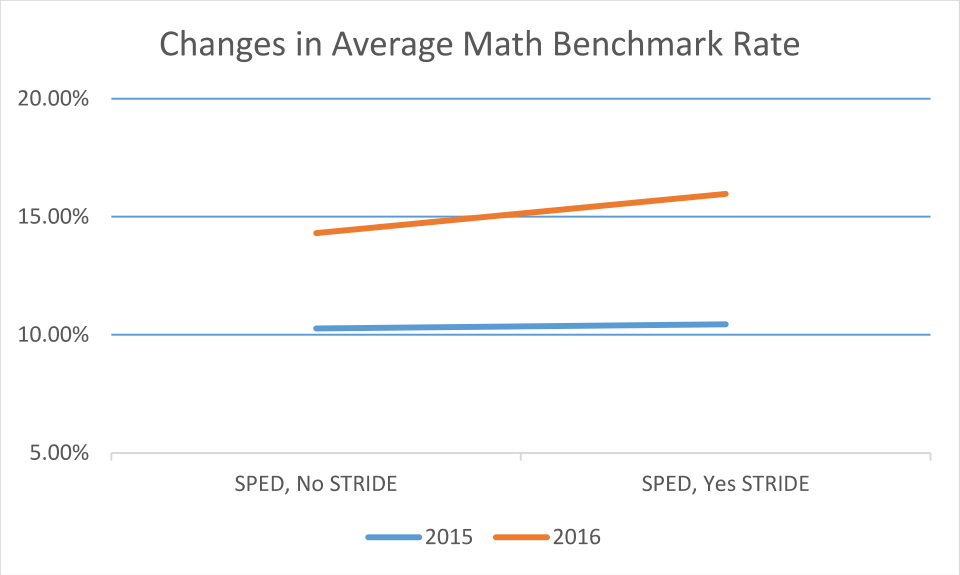
Black



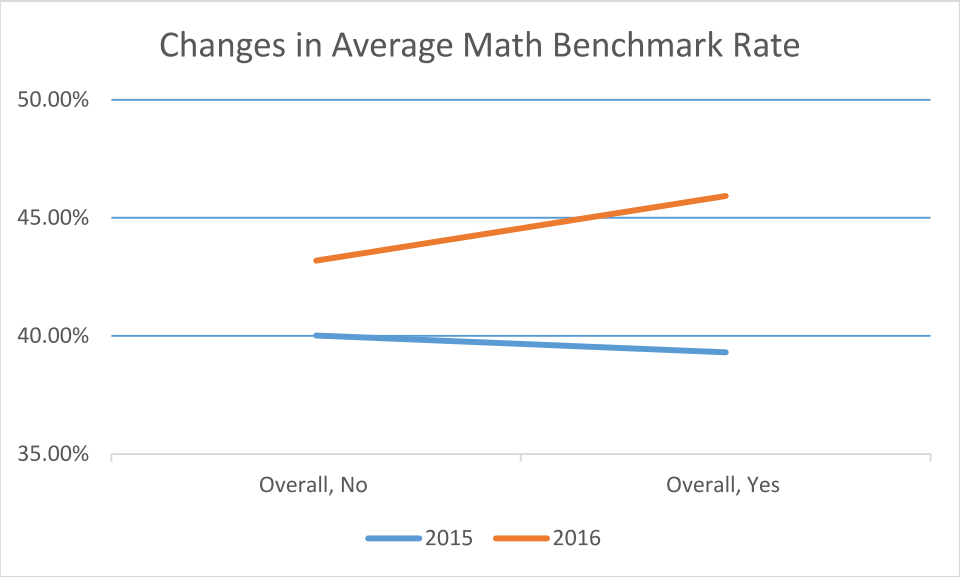
Poverty



SPED



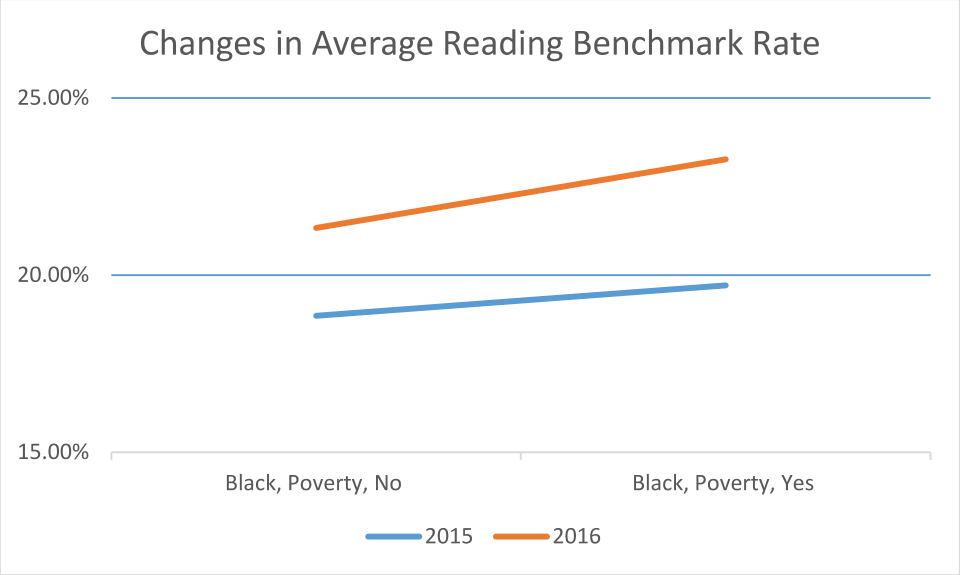
All students



Appendix II

Percent of students passing the benchmark for Reading

Black and Poverty



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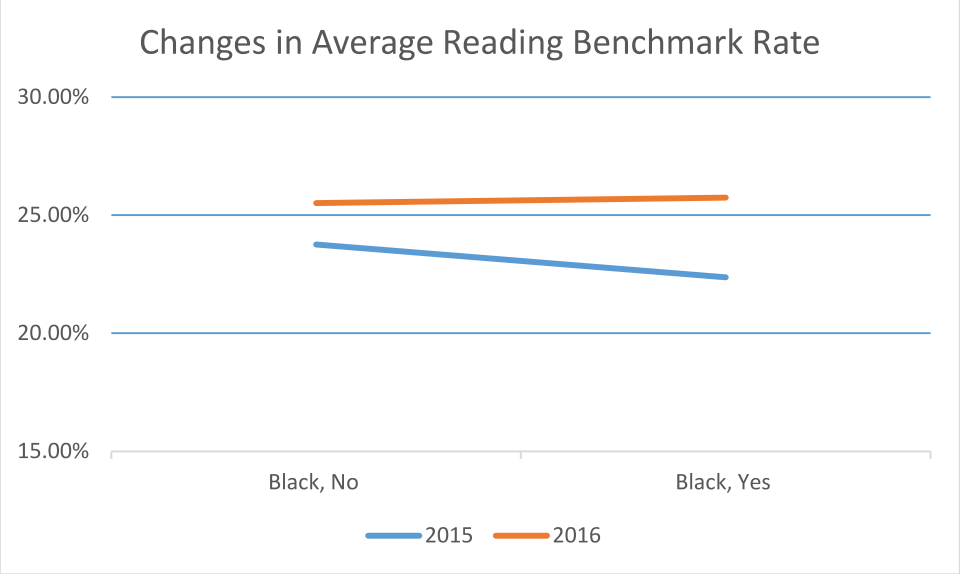
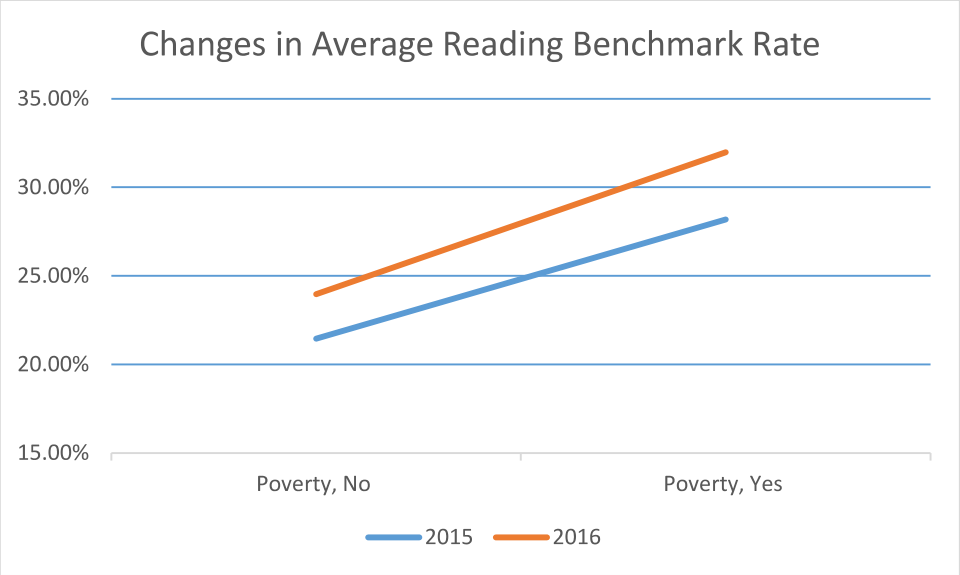
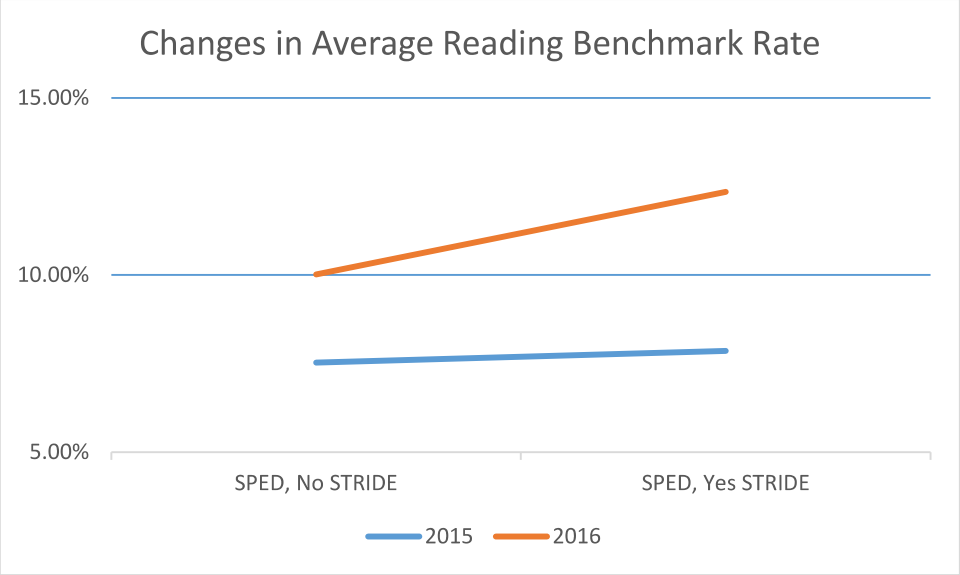


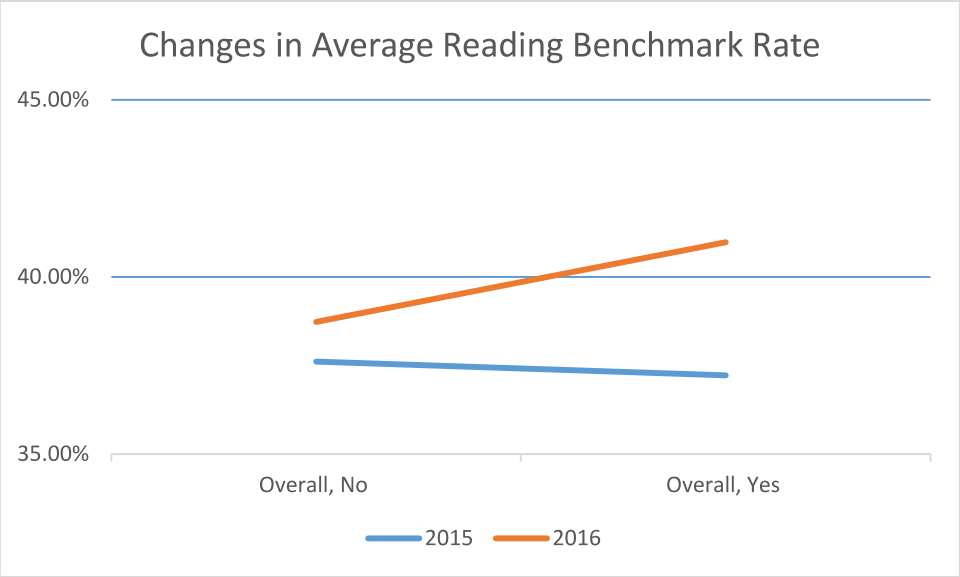
Poverty



SPED



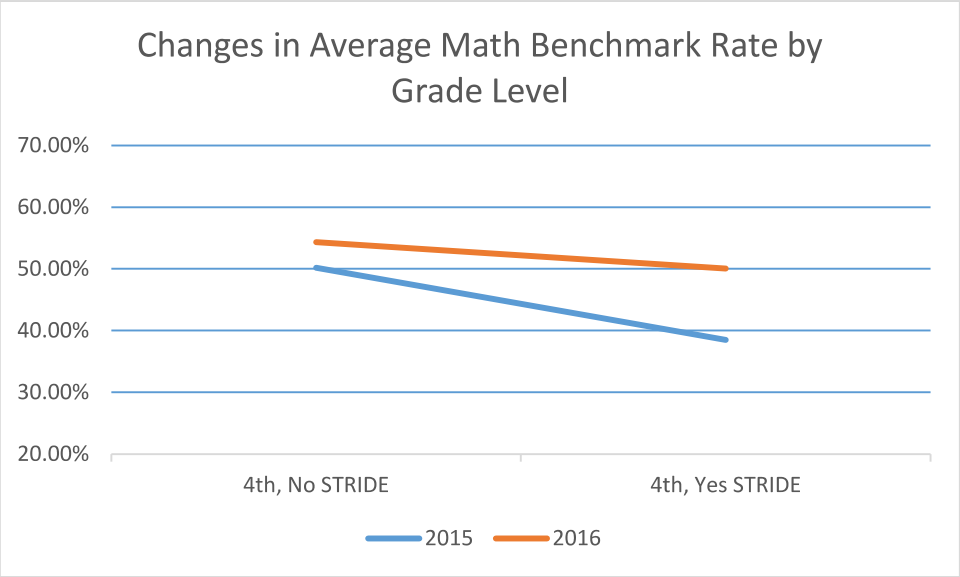
All Students



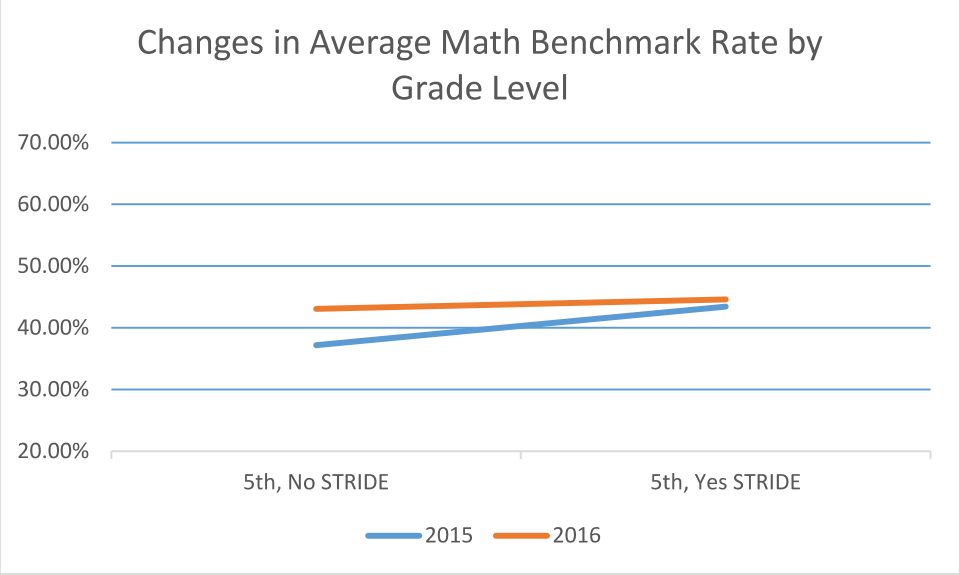
Appendix III

Percent of students passing the benchmark for Math by grade

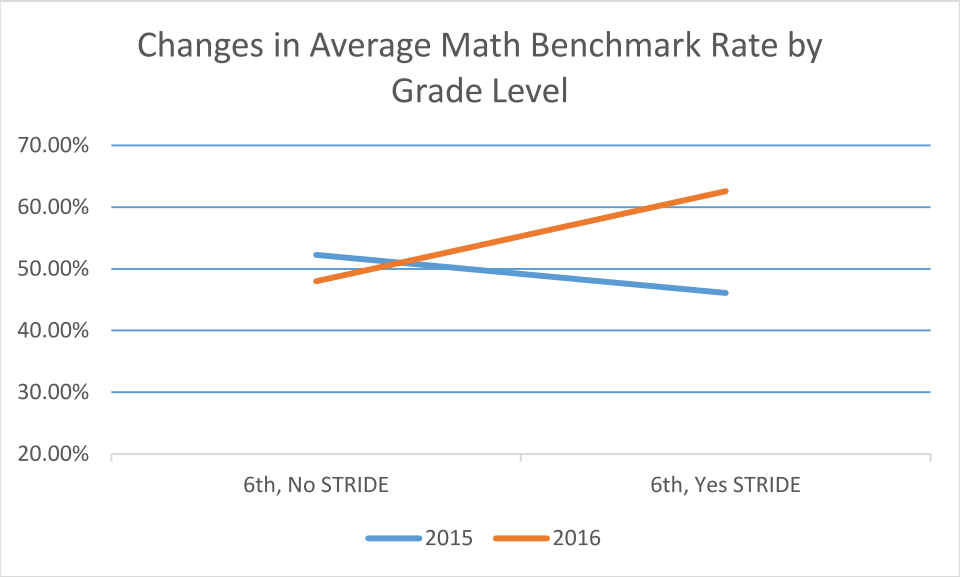
4th



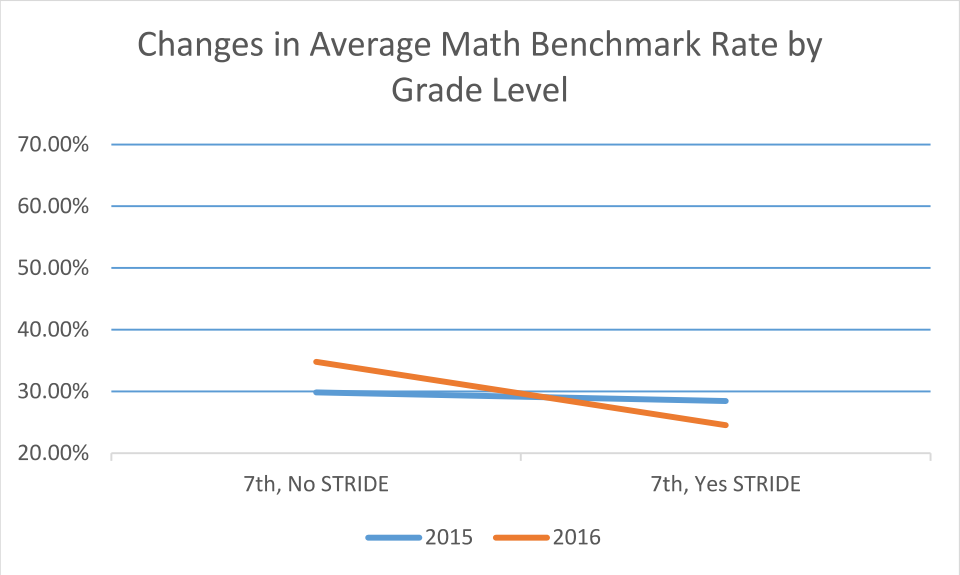
5th



6th


Changes in Average Math Benchmark Rate by Grade Level
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
6th, No STRIDE
6th, Yes STRIDE
2015
2016

7th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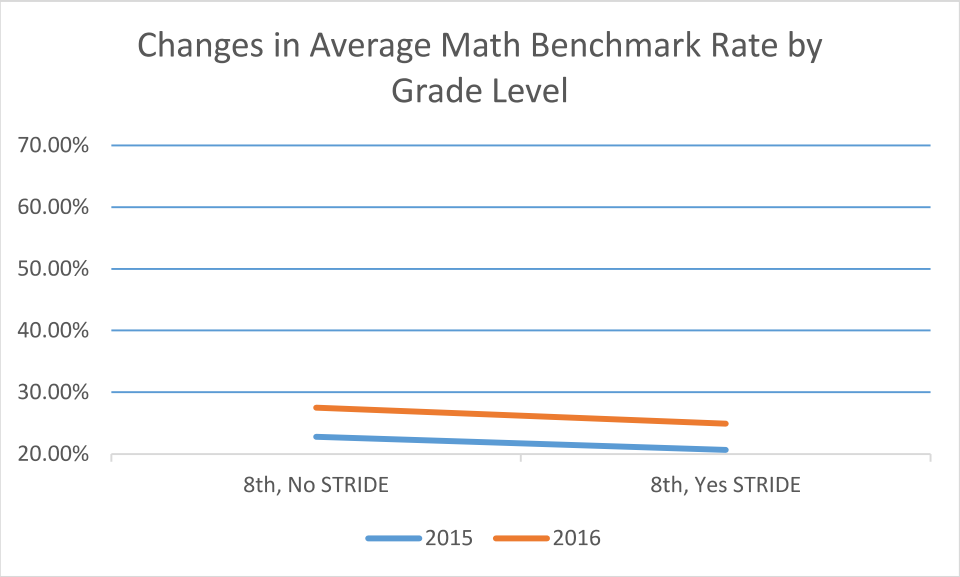
50.00%
40.00%
30.00%
20.00%
7th, No STRIDE
7th, Yes STRIDE
2015
2016

8th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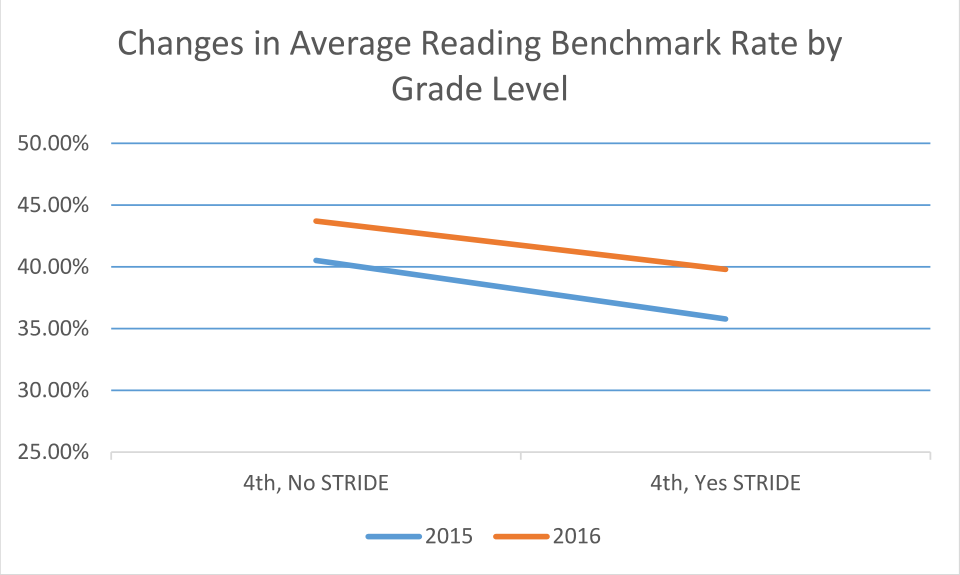
50.00%
40.00%
30.00%
20.00%
8th, No STRIDE
8th, Yes STRIDE
2015
2016

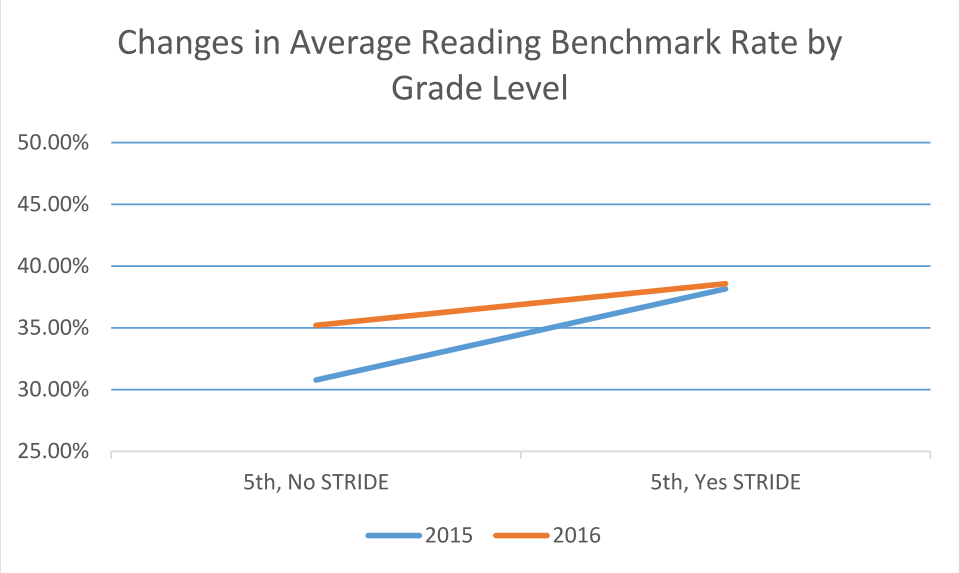
Appendix IV

Percent of students passing the benchmark for Reading by grade

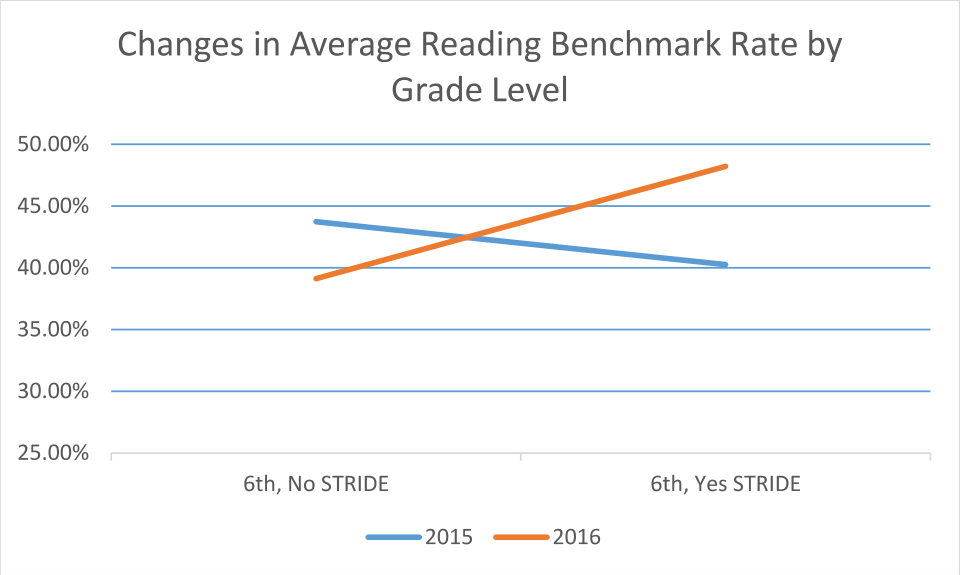
4th



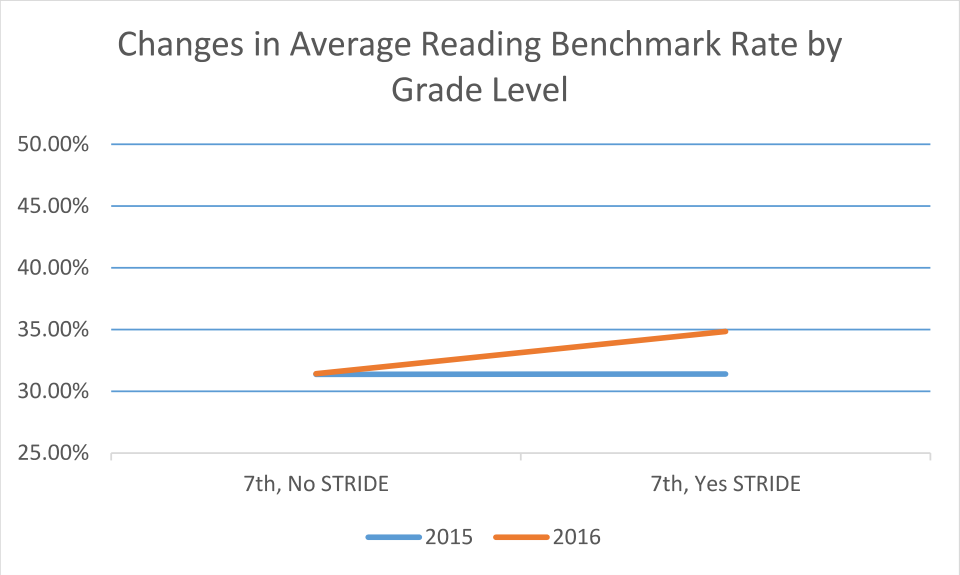
5th



6th


Changes in Average Reading Benchmark Rate by Grade Level
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
6th, No STRIDE
6th, Yes STRIDE
2015
2016

7th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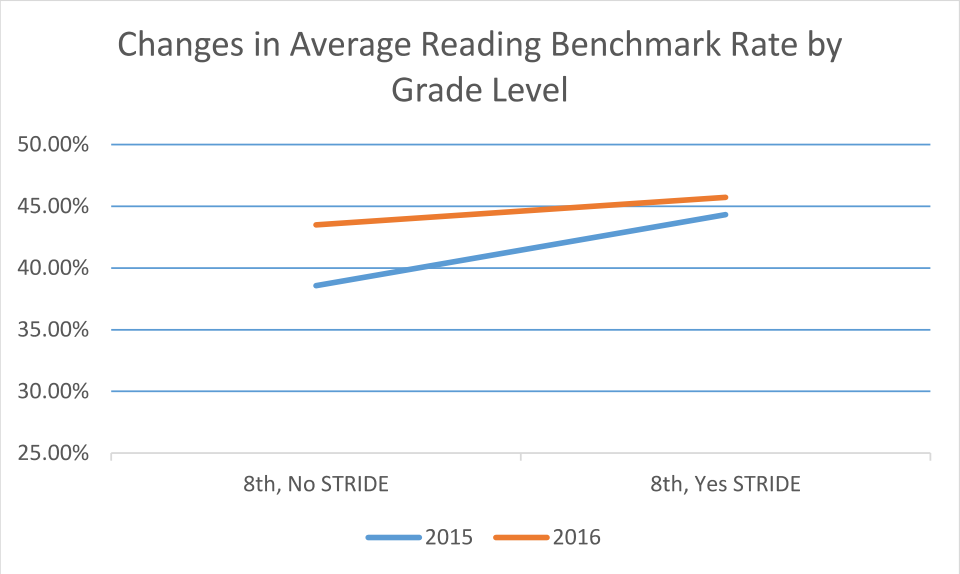
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