NATIONAL LEXILE STUDY

AN ANALYSIS OF LITERACY GROWTH AND ACHIEVE3000'S SOLUTIONS

EXECUTIVE SUMMARY

In the summer of 2019, MetaMetrics and the Successful Practices Network conducted an independent analysis of usage and performance data for students using Achieve3000's literacy solutions during the 2018-19 school year. They employed multiple methods, including machine learning modeling. This is a summary of their analysis.

NOVEMBER 2019

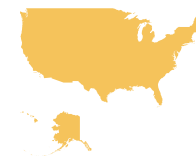## ONE OF THE LARGEST READING STUDIES EVER!

1,179,898 STUDENTS

5,898 SCHOOLS

1,273 DISTRICTS

50 STATES
(plus Washington, D.C. & 4 U.S. Territories)

84,416,506 TOTAL LOGINS

62,910,493 ACTIVITIES

63% OF STUDENTS LOG IN **AFTER SCHOOL**
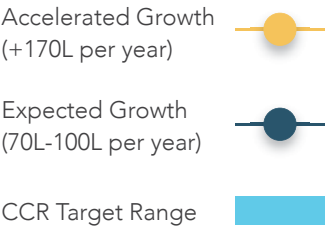
MetaMetrics® | SPN Successful Practices Network

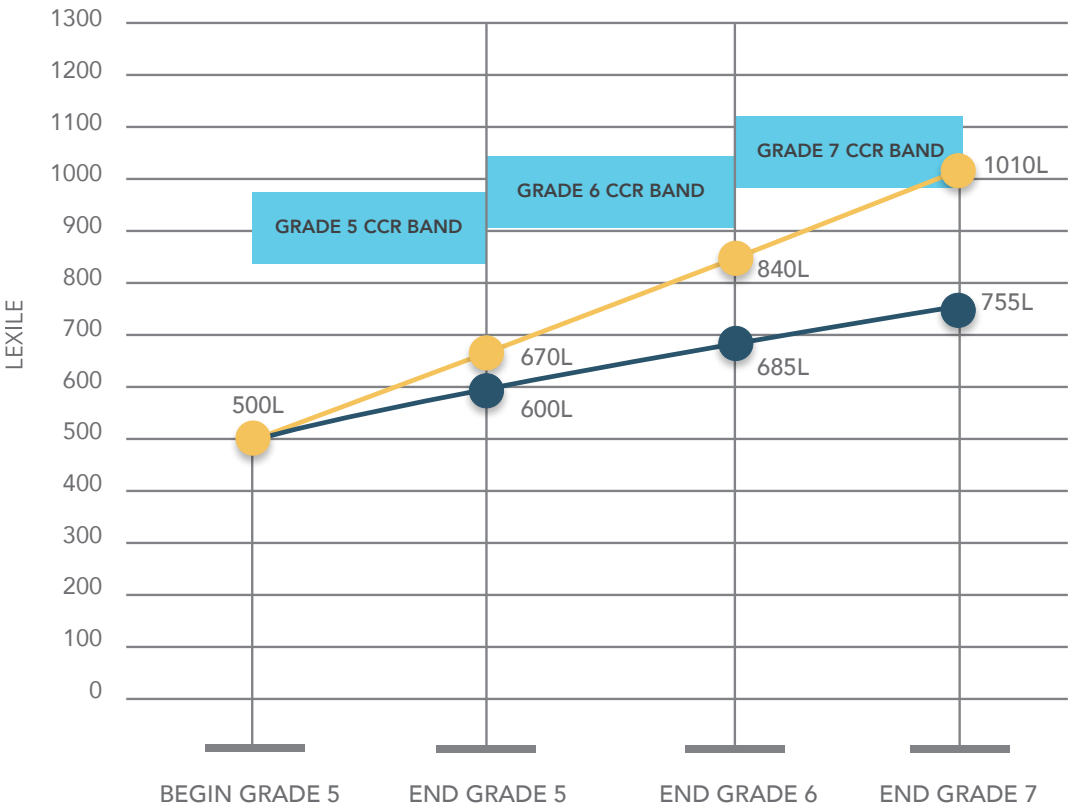# THIS IS WHAT WE MEAN WHEN WE SAY, *ACCELERATED LITERACY GROWTH*

Several reports inside the Teacher Edition of Achieve3000's PRO reference students' actual and expected Lexile growth. Expected growth is based on MetaMetrics's proprietary formula (MetaMetrics, 2004), which considers the student's initial Lexile® measure and the length of time from the student's beginning-of-year measure to the end-of-year measure. Actual growth is calculated by subtracting the student's beginning-of-year Lexile measure from her current or end-of-year Lexile measure. Accelerated growth is any growth above a student's expected growth. Achieve3000 is especially committed to making accelerated literacy growth possible for more students, especially below grade-level readers. When we consider shifts in Lexile growth, it is important to remember that students who are performing below grade-level often need to double or triple their expected growth over the course of two to three years in order to achieve college and career readiness by high school graduation. (See chart below.)

This chart shows the expected growth and acceleration trajectories for a fifth grader who is reading two years below grade level. He would need to attain an accelerated rate of growth—1.7 times the expected rate of growth—to achieve college and career readiness by the end of seventh grade. The gap between expected and accelerated growth grows wider each year the student does not get on track for college and career readiness.
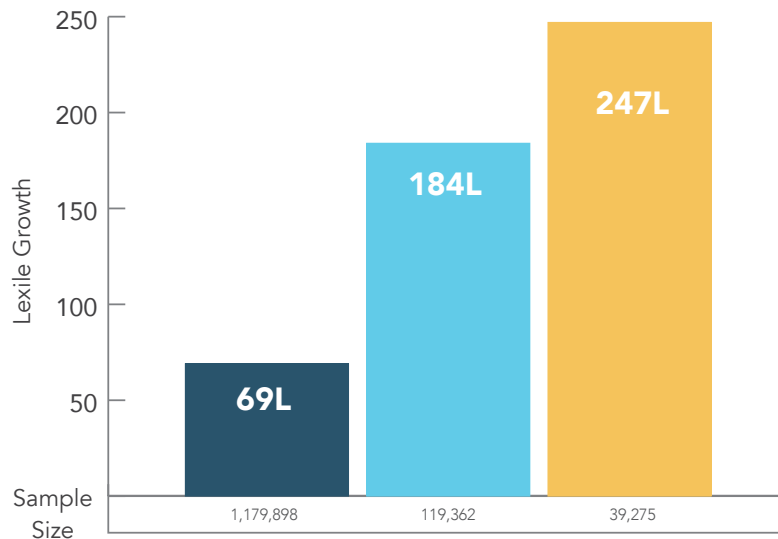
THIS STUDENT NEEDS TO ATTAIN 1.7 TIMES THEIR EXPECTED GROWTH TO GET ON TRACK FOR COLLEGE AND CAREER READINESS.

Accelerated Growth
(+170L per year)

Expected Growth
(70L-100L per year)

CCR Target Range

GROWTH TRAJECTORIES FOR A GRADE 5 STUDENT READING 2 YEARS BELOW GRADE LEVEL

LEXILE

GRADE 5 CCR BAND

GRADE 6 CCR BAND

GRADE 7 CCR BAND

500L
670L
600L
840L
685L
1010L
755L

BEGIN GRADE 5   END GRADE 5   END GRADE 6   END GRADE 7

ACCELERATED GROWTH FOR ALL STUDENTS

Lexile Growth

- 250
- 200
- 150
- 100
- 50

69L — Sample Size 1,179,898
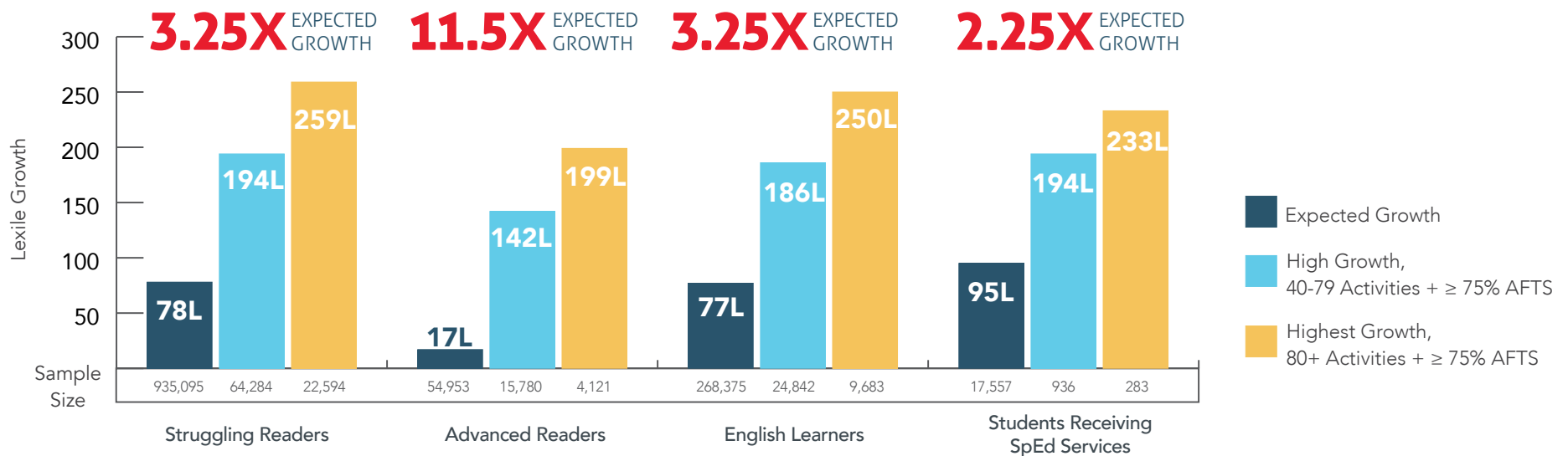**184L** — 119,362
247L — 39,275

OVERALL AND ON AVERAGE, STUDENTS ATTAIN MORE THAN 3.5X THEIR EXPECTED LEXILE GROWTH WHEN COMPLETING TWO OR MORE LESSONS WITH AN AVERAGE FIRST-TRY SCORE OF ≥ 75% EACH WEEK.

Achieve3000's patented methodology for delivering just-right content at the just-right time ensures that students who maintain an average first-try score (AFTS) of 75% or more on the assessments embedded within each lesson will receive more challenging texts to help them grow. Because the text is matched to every student's reading level, it is fair and reasonable to expect that they can attain a 75% average over the course of the school year. For this reason, our two growth categories only look at students who achieved an AFTS of ≥75%.

- ■ Expected Growth
- ■ High Growth, 40-79 Activities + ≥ 75% AFTS
- ■ Highest Growth, 80+ Activities + ≥ 75% AFTS

ACCELERATED GROWTH FOR EVERY TYPE OF LEARNER

3.25X EXPECTED GROWTH   **11.5X** EXPECTED GROWTH   **3.25X** EXPECTED GROWTH   **2.25X** EXPECTED GROWTH

Lexile Growth

- 300
- 250
- 200
- 150
- 100
- 50

Struggling Readers: **78L**, **194L**, **259L** — Sample Size 935,095 / 64,284 / 22,594

Advanced Readers: **17L**, **142L**, **199L** — Sample Size 54,953 / 15,780 / 4,121

English Learners: **77L**, **186L**, **250L** — Sample Size 268,375 / 24,842 / 9,683

Students Receiving SpEd Services: **95L**, **194L**, **233L** — Sample Size 17,557 / 936 / 283

- ■ Expected Growth
- ■ High Growth, 40-79 Activities + ≥ 75% AFTS
- ■ Highest Growth, 80+ Activities + ≥ 75% AFTS

HIGHER ENGAGEMENT YIELDS HIGHER PREDICTED LITERACY GROWTH

PREDICTED READING GROWTH MODELS CREATED WITH DEEP NEURAL NETWORK ANALYSIS

Given the large number of students and usage behaviors captured in the analytical data file, MetaMetrics decided to use machine learning techniques to develop models of Lexile growth. The goal of the analysis was to explore the predictive power of Achieve3000 usage and how usage behavior can be used to define engagement in a way that is tied to growth. Anybody who has spent time in a classroom knows that one of the primary struggles faced by educators is keeping their students engaged in tasks that are conducive to learning. The following analyses seek to measure students' degree of engagement with their reading and writing practices while using Achieve3000's PRO literacy solutions and demonstrate the positive relationship between engagement and literacy growth.

In their initial model, MetaMetrics considered only two factors: Lexile level and grade. As can be seen for portions of the visualization (graph to the right), this simple model shows a divergence of trajectories in the predicted reading growth rate according to a student's grade level and Lexile measure. For example, a third-grade student with a reading measure of 600L is expected to gain approximately .5L each day. Following the white lines within the heat map shows this student is likely to stay on-track for college and career readiness, attaining a 1600L by the time he graduates high school. Conversely, a student in third grade with a reading measure of 200L is not predicted to exceed a reading measure of 800L by high school graduation. This is commonly known as the Matthew effect which asserts that, "the rich get richer and the poor get poorer." The Matthew effect has been written about in academic literature with regards to education and reading in particular (Stanovich, 2009). The Achieve3000 dataset provides an example of this particular phenomenon—wherever the heatmap gets "hotter" going up the y-axis (Lexile), the Matthew effect is observed. Although not ubiquitous, the Matthew effect is observed for significant portions of the data.

PREDICTED READING GROWTH RATES BASED ON LEXILE LEVEL AND GRADE ONLY
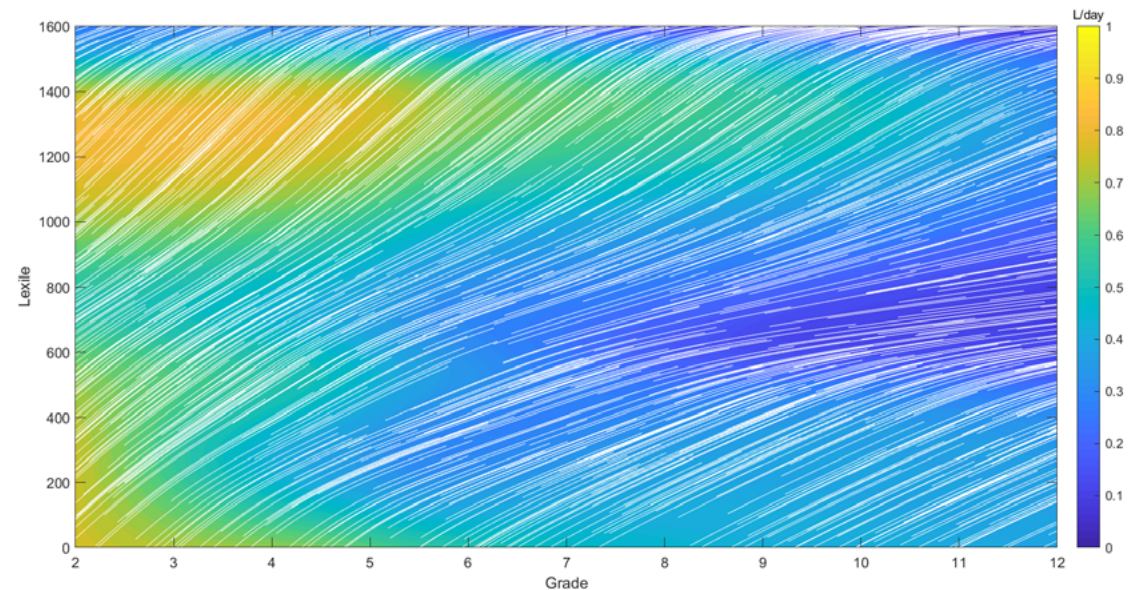
THE MATTHEW EFFECT, WHICH ASSERTS THAT THE "RICH GET RICHER, AND THE POOR GET POORER" IS OBSERVED FOR SIGNIFICANT PORTIONS OF THIS DATA.

HOW DO WE MEASURE THE IMPACT OF ENGAGEMENT ON READING GROWTH?

In a second model, MetaMetrics included 12 more dimensions reflecting student usage of various features of the Achieve3000 platform, such as the number of *Lessons, Activities, Reading Connections and Thought Questions* students completed each day as well as the percent of time students spent using enrichment, intervention, and language scaffolds.

These additional data points dramatically increased the predictive power of the model. In fact, when comparing the percent of reading growth variation that can be attributed to status only (grade and Lexile level) and that which can be attributed to a students' level of engagement with Achieve3000's literacy solutions, it can be concluded that 28% of the variation in reading growth rates can be explained by status and usage behavior with Achieve3000's products, and that adding usage behavior within Achieve3000's products increases the amount of explainable variation by 75%.
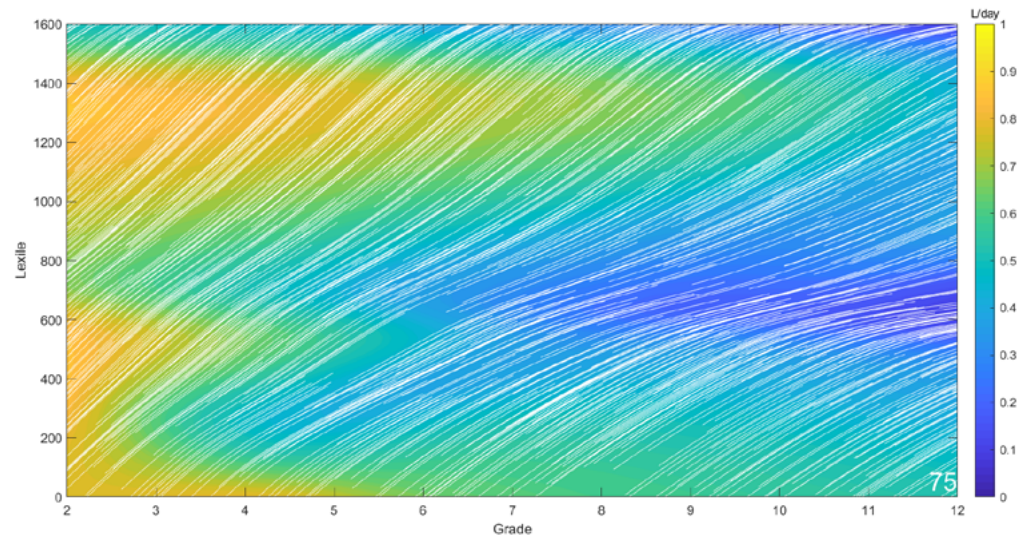
USAGE BEHAVIOR WITHIN ACHIEVE3000'S LITERACY SOLUTIONS INCREASES THE AMOUNT OF EXPLAINABLE VARIATION IN READING GROWTH BY 75%.

PREDICTED READING GROWTH RATE BASED ON GRADE, LEXILE, AND HIGH ENGAGEMENT

The two models described above allowed MetaMetrics to represent students' engagement with Achieve3000's PRO literacy solutions by normalizing the variance in predicted growth due to usage behaviors relative to predicted growth according to Lexile level and grade only on a scale of 0 to 100. MetaMetrics called this a student's Engagement Score. For example, an Engagement Score of 25 places a student's additional predicted reading growth due to their usage profile at the 25th percentile among students with a similar grade and Lexile.

The above plot demonstrates the predicted reading growth rates for students with relatively high engagement scores of 75. When compared to the status only model, we observe rather high predicted growth rates, with some hypothetical students predicted to grow at rates above 0.8L per day. Engagement scores of 90 can sometimes yield predicted reading growth rates over 1L per day!

Based on these analyses, MetaMetrics concluded that greater usage of the available feature set, which is used to define engagement, is strongly associated with and predictive of greater reading growth within Achieve3000's PRO literacy solutions.

METAMETRICS CONCLUDED THAT GREATER ENGAGEMENT IS STRONGLY ASSOCIATED WITH AND PREDICTIVE OF GREATER READING GROWTH.

THE JOURNEY TO COLLEGE AND CAREER READINESS BEGINS HERE

It's useful to think of college and career readiness as a journey. Since expectations have shifted toward a more rigorous outcome, it is critical to understand that, for below-grade-level readers, it will take two or three years to reach college and career readiness reading levels. Because we know a student's expected growth, and we know the approximate Lexile measure students need to attain to be competitive in the workforce and successful in college, we can make a prediction about whether or not a student is or isn't "on track" to reach 1300L by the end of their high school year, depending on their grade level and current Lexile measure. Students who are in the two *Not on Track* categories shown in the table below are not meeting the college and career readiness targets for their grade while students in the two *On Track* categories are meeting grade-level targets and can be expected to read at or above 1300L by the time they graduate as long as they continue to achieve expected or greater growth every year.

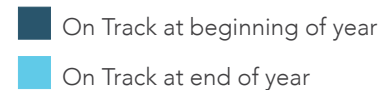| COLLEGE AND CAREER READINESS PROFICIENCY RANGES				
	Not On Track		On Track	
GRADE	FALLS FAR BELOW	APPROACHES	MEETS	EXCEEDS
1	BR115 and Below	BR110 to 185L	190L—530L	535L and Above
2	150L and Below	155L—415L	420L—650L	655L and Above
3	265L and Below	270L—515L	520L—820L	825L and Above
4	385L and Below	390L—735L	740L—940L	945L and Above
5	500L and Below	505L—825L	830L—1010L	1015L and Above
6	555L and Below	560L—920L	925L—1070L	1075L and Above
7	625L and Below	630L—965L	970L—1120L	1125L and Above
8	660L and Below	665L—1005L	1010L—1185L	1190L and Above
9	775L and Below	780L—1045L	1050L—1260L	1265L and Above
10	830L and Below	835L—1075L	1080L—1335L	1340L and Above
11/12	950L and Below	955L—1180L	1185L—1385L	1390L and Above

SOURCE: METAMETRICS

GROWTH IN COLLEGE AND CAREER READINESS*

Percentage of Students

- 19% — n= 221,307
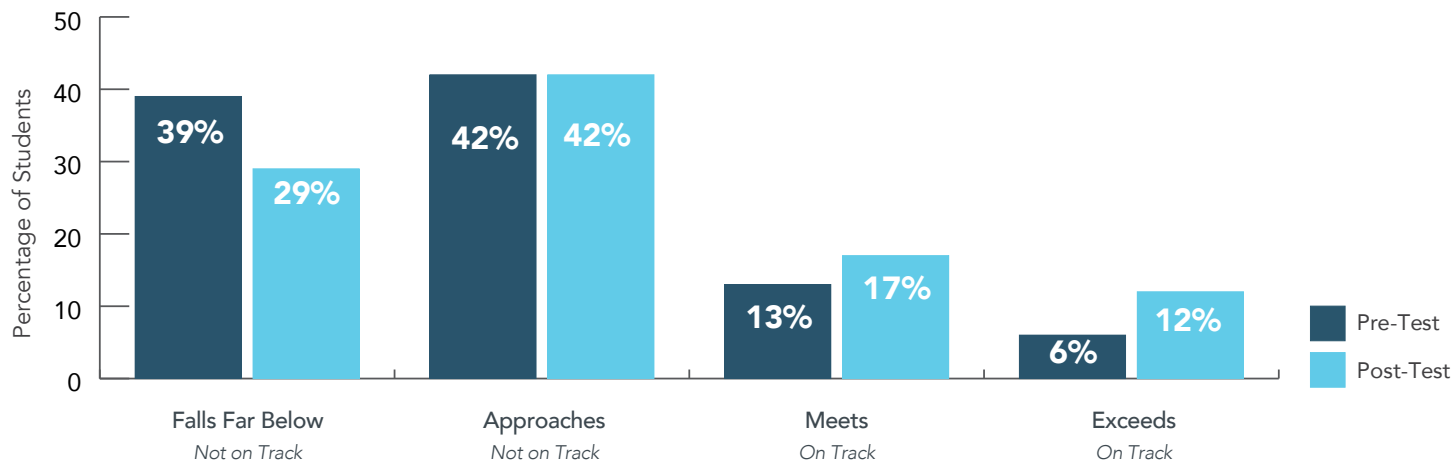- 30% — n= 345,858
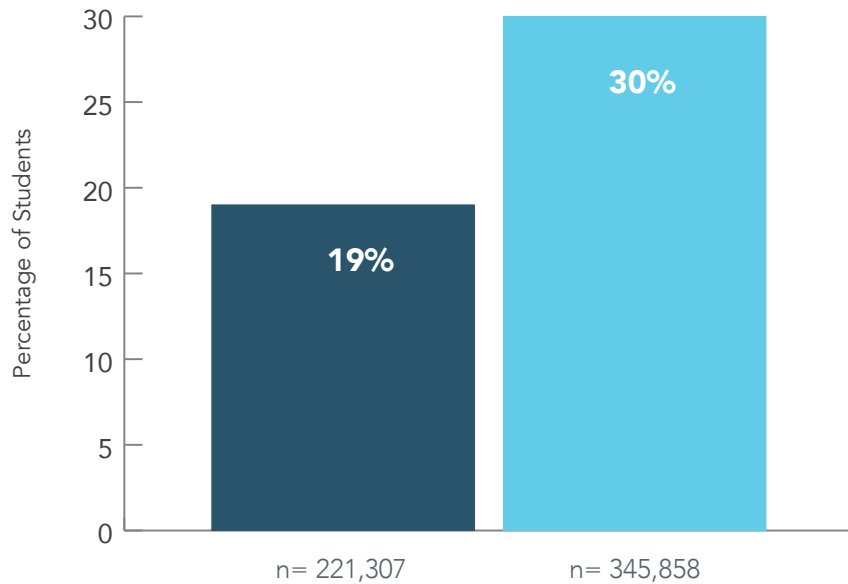
METAMETRICS FOUND THAT THE PERCENT OF STUDENTS WHO WERE ON TRACK FOR COLLEGE AND CAREER READINESS INCREASED BY 56%.

Overall and on average, the percentage of students who were *On Track* increased from fall to spring from 19 to 30 percent, while the percentage of students who were *Not on Track* decreased from 81 to 70 percent.*

There was a 56 percent increase in the percentage of students who were *On Track* by spring, with 124,551 more students reaching these benchmarks by the end of the year.

- ■ On Track at beginning of year
- ■ On Track at end of year

MOVEMENT IN COLLEGE AND CAREER READINESS

Percentage of Students

Category	Pre-Test	Post-Test
Falls Far Below *Not on Track*	39%	29%
Approaches *Not on Track*	42%	42%
Meets *On Track*	13%	17%
Exceeds *On Track*	6%	12%

- ■ Pre-Test
- ■ Post-Test

Note: Students' initial CCR based on pre-test LevelSet. Students' ending CCR based on post-test LevelSet or auto-adjustment.

Note: The percentage of students who were On Track at the end of the year was greater than the percentage who were On Track at the beginning of the year, and this difference is statistically significant, t = 541.23, p < 0.0001.

REFERENCES

MetaMetrics, Inc. (2004). Unpublished growth data.

Stanovich, K. E. (2009). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. Journal of Education, 189 (1-2), 23-55.

2018-2019 National Lexile Study

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Dr. Bill Daggett is a nationally acclaimed author, presenter, thought leader, and adviser to educators and their stakeholders in planning and implementing systemic school change.

Dr. Malbert Smith III, Ph.D., is the president of MetaMetrics, an educational measurement and research organization. Together with co-founder and Chief Executive Officer, A. Jackson Stenner, Ph.D., Dr. Smith created The Lexile Framework for Reading; El Sistema Lexile para Leer, the Spanish-language version of the widely used reading framework; The Lexile Framework for Writing; and The Quantile® Framework for Mathematics.

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