

RESEARCH BRIEF

May 2020

The Impact of School Closures on Student Learning

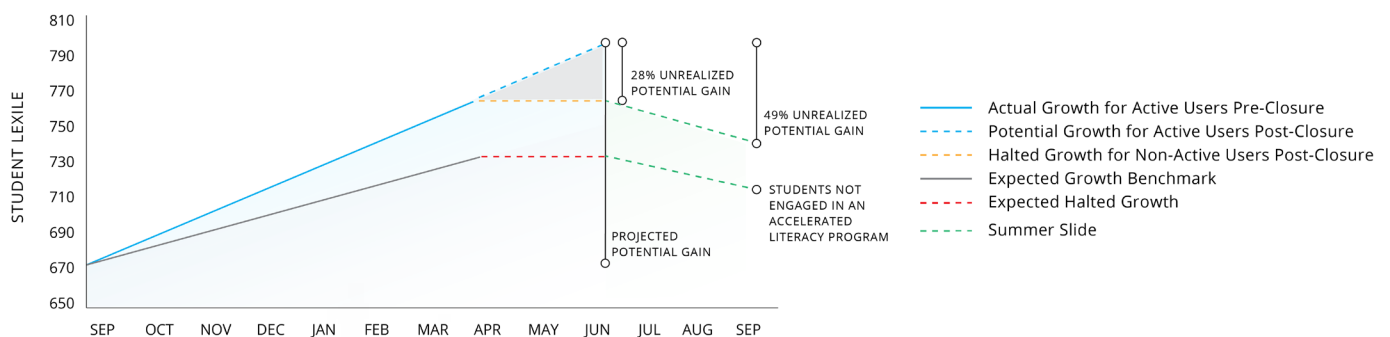
An analysis of real-time data for 1.6 million students using Achieve3000 Literacy

Executive Summary | by Ray McNulty and Kevin Baird

The coronavirus crisis has already reshaped primary and secondary education in America, as schools across the country have transitioned from classroom instruction to online learning for millions of students in a matter of weeks (EdWeek, 2020). Consensus is building that the consequences of closing schools before the end of the academic year will have significant and far-reaching implications for students' learning. Already, a recent analysis by NWEA (2020) argues that students may return to school in fall 2020 with significant regression in skills.

Using real-time student reading data from 1.6 million students in the United States, we have isolated specific trajectories for students based on their degree of engagement with online learning before and after school closures. Benchmarking to normed measures, specifically the Lexile Framework® for Reading and a related body of predictive evidence on reading outcomes, we demonstrate already-present, measurable trends, using data through April 30, 2020.

Predicted Learning Loss Due to School Closures (2019-2020)



If students can remain engaged in online learning from home with a similar degree of usage and performance as they experienced in school, they are likely to maintain their same rate of projected growth—the blue dotted line.

Alternatively, when students' learning opportunities are cut short, and there are not already robust online learning solutions in place, students will experience significant losses that could have been avoided—the yellow dotted line.

| Trends

From the analyses in this report, we have identified the following trends:

- **Slow Transition for Most Schools**

Schools differed widely in how quickly and how well they made the transition to online learning. Our usage data shows that about one quarter of districts (24%) continue to show high student usage after the closures that is close to or on par with their usage prior to closing. Overall, however, there is evidence of a serious decline in student usage (43% fewer students logging in to Achieve3000 Literacy ¹, and 44% fewer students completing a lesson).

- **Learning Slide Commences**

Based on our early data, it appears that school closures as a result of the coronavirus crisis will lead to a significant loss of potential learning gains for many students, which could be as high as 28% for many students by June. Given existing data about how student reading scores decline over the summer, students could lose 49% of potential learning gains by the start of next school year.

- **Achievement Gap Predicted to Widen**

The achievement gap has already widened in weeks. We predict that the achievement gap between low- and high-income students could increase by as much as 18% for students from low-income schools with no learning activity during the school closures. Fortunately, we also found evidence that the achievement gap, on average, is widening less than the worst-case scenario, meaning that some students in low-income schools are remaining active in their schoolwork from home.

- **More Online Usage by Advanced Readers**

It is already clear that struggling readers are not using online learning as frequently as advanced readers, placing them at risk of falling further behind. Based on our data, the gap between struggling and advanced readers could grow by up to an additional 6% because of school closures. But we also found evidence that the performance gap, on average, is widening less than the worst-case scenario, meaning that some struggling readers are taking advantage of at-home learning opportunities.

- **Some Districts Are Succeeding With Online Learning**

Despite the challenges, there are success stories. We found examples of districts who transitioned almost seamlessly between school-based and online instruction. For these districts, levels of usage of Achieve3000 Literacy after the school closures look very similar to usage before the school closures.

¹ Achieve3000 Literacy is an online learning platform delivering differentiated content inside an instructional routine designed to accelerate literacy growth. It is accessible from any computer with an internet connection either in school or at home.

| Recommendations

Each school district and school is unique, and each faces unique challenges. For every district, current priorities include ensuring that students' most urgent needs (e.g., food) are met, and that students have equitable access to resources and support. With this in mind, based on our early conclusions, we can offer a number of initial recommendations for how schools and districts can promote online learning. Uncertainty about what the next school year will look like, and the need to prepare for future circumstances that may require school closures, make clear that educators will need to sustain student learning even when students are not in the classroom. Accordingly, here are our recommendations:

- **Plan Now for Next Year**

Many schools were unprepared to make the transition to remote instruction. In order to avoid similar rates of learning loss in future years, schools will want to evaluate the efficacy of their existing online instruction and begin planning for improvements that can be implemented by the start of next school year.

- **Use Summer to Catch-Up**

The slide has already commenced. Using the summer in a meaningful way will be critical to make sure the majority of students begin the next school year where they would have been had schools not closed early.

- **Mind the Gap**

Not only are most students going to be further behind because of schools closing, those who fall at or below the 25th percentile in reading are going to fall further behind their higher-performing peers. Providing access to robust online learning resources that include scaffolds and other supports specifically designed to accelerate reading growth is imperative.

- **Build a New Skill**

Virtual learning is now a career skill that needs to be mastered by both educators and students. We need to transition our thinking from “teaching and learning onsite or remotely” to “a technology-enabled approach to all teaching and learning.”

While educators may not have been able to predict that the school year would end early, that the transition to online learning would be so difficult, or that learning gains would decline so quickly, there is sufficient evidence to justify a full commitment to ensure that the potential losses predicted in this report will not be repeated during future sustained periods of school closures.

Widespread closure of American schools for an indefinite period of time, accompanied by a sudden and

Table of Contents

Introduction 1

Sample and Methodology 2

Results

Overall Loss in Predicted Reading Growth 3

Student Usage and Performance Pre- Versus Post-School Closures 5

Impact of Potential Learning Loss on The Achievement Gap 7

Impact of Learning Loss on Struggling and Advanced Readers 8

Success with Remote Learning Post-School Closures 10

Districts with Successful Usage 11

Conclusions 14

About This Brief 14

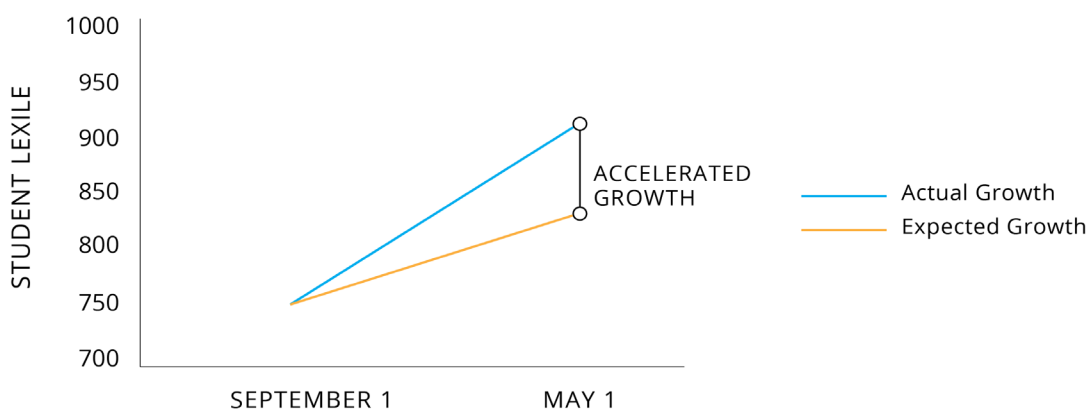
References 15

Introduction

unprecedented shift in student and teacher activity to online learning, suggests that student learning outcomes may shift. A recent analysis by NWEA (2020) argues that students may return to school in fall 2020 with significant regression in skills.

Using real-time student reading data from 1.6 million students using Achieve3000 Literacy in the United States, we have isolated specific trajectories for students based on their degree of engagement with online learning before and after school closures. Benchmarking to normed measures, specifically the Lexile Framework® for Reading and a related body of predictive evidence on reading outcomes, we demonstrate already-present, measurable trends, using data through April 30, 2020.

Graph 1: Illustration of the Difference Between Expected and Actual Lexile Growth



Expected growth is a normative benchmark representing growth that is expected to occur. In contrast, actual growth represents the growth, above or below the expected amount, that students really experience.

Sample and Methodology

Achieve3000 Literacy for grades 2-12 uses the LevelSet™ assessment tool and a proprietary software engine to determine student reading ability on an ongoing basis. This system uses a Bayesian scoring algorithm to produce repeated measures of students' reading abilities. The Bayesian approach uses prior scores to refine each new estimate of achievement to improve the accuracy of measurement as students learn. Student Lexile® measures are updated monthly.

At the beginning of each school year, students using Achieve3000 Literacy take a LevelSet pre-test, which produces a baseline Lexile measure. Using a proprietary forecasting algorithm provided by MetaMetrics®, a forecasted post-test Lexile measure is calculated using May 1 as the end date.

The growth trajectory between a student's pre-test and forecasted post-test is considered the "expected" growth for the student. It represents a normative benchmark against which a student's actual Lexile growth can be compared. It can be thought of as the growth that would occur under typical conditions in which a student is attending school, receiving reading instruction, and is otherwise developing language capabilities that normally occur as the student ages.

A line can be drawn between a student's pre-test and forecasted (i.e., expected) post-test score to estimate an Expected Growth Benchmark. If a student's actual Lexile growth exceeds their expected growth at any point on the line, the student is said to have experienced accelerated growth (see Graph 1).

Use of Achieve3000 Literacy represents an effort to improve reading achievement, and research shows that this additional effort leads to rates of Lexile growth greater than expected growth (Achieve3000, 2019). This is a reflection of several factors:

1. A general commitment by purchasing schools to improve reading achievement;
2. The amount of instructional time devoted to reading instruction, including use of Achieve3000 Literacy; and
3. The effects of the particular tasks students perform in Achieve3000 Literacy, which are conducive to improving reading skills.

Thus, the actual Lexile growth of students represents a particular outcome of the efforts of schools. When schools closed because of the COVID-19 pandemic, this effort came to an abrupt halt. Using Achieve3000's database of 1.6 million students, it was possible to estimate the effect of the closure of schools through the end of the current school year on academic learning. To estimate students' Lexile measures at the end of the school year, students were required to have:

- A pre-test Lexile measure;
- A forecasted post-test Lexile for May 1 based on typical growth expectations; and
- A second Lexile measure at least 90 days after the pre-test and before March 15, when most schools had closed.

Moreover, for inclusion in this report, students had to be located in the United States and using the English edition of Achieve3000 Literacy.

Results | Overall Loss in Predicted Reading Growth

In Graph 2 (*see page 4*), the solid blue line represents the rate of growth exhibited by students using Achieve3000 Literacy during the 2019-2020 school year up to March 15. We call this Actual Growth for Active Users Pre-closure. For this analysis, Lexile growth trajectories were projected to June 1 linearly using the daily Lexile growth rate exhibited up to March 15. We call this Potential Growth for Active Users Post-closure, and it is represented by the dotted blue line in Graph 2.

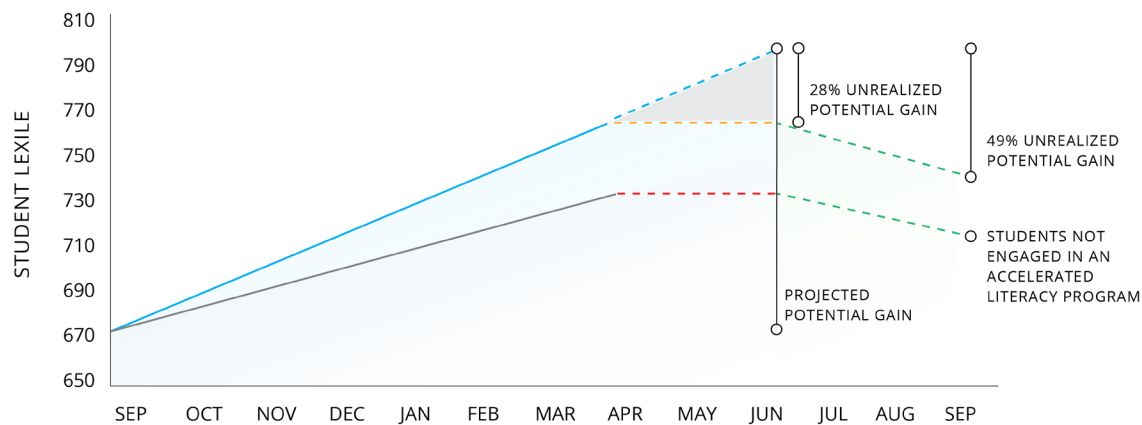
A worst-case prediction for the remainder of the school year is for no additional growth to occur. This is represented in the graph below as Halted Growth for Non-Active Users Post-Closure – the yellow dotted line. This could be seen as a conservative worst-case scenario, as it is possible students could actually regress if they do not engage at all in schoolwork for the remainder of the school year. The red dotted line represents what could be seen as the worst-case experience of students who were not engaged in the Achieve3000 platform during the 2019-2020 school year.

The difference between the Potential Growth for Active Users Post-Closure (blue dotted line) and the Halted Growth for Non-Active Users Post-Closure (yellow dotted line) represents the growth that could be lost as a result of the pandemic.

Based on these projections, the unrealized Lexile growth could be as high as 28% for many students. However, that is an avoidable outcome. The gray region represents the potential benefit for students who are able to engage in online learning activities as extensively as prior to the closure. If they engage at the same level as before the closure, they could grow at the rate they were projected to grow – the blue dotted line. These findings support the conclusion that when students' learning opportunities are cut short, and there are not already robust online learning solutions in place, students will experience significant losses that could have been avoided.

Unfortunately, the decline due to school closures will be compounded by the summer break, when no instruction may occur, online or otherwise. Recently, NWEA conducted research (NWEA, 2018) to estimate the impact of the summer slide. They found that students in grades 3-6 typically lose 20% of their gains in reading from the prior school year, while students in grades 7-12 typically lose 36%. Inferring from NWEA's findings, we computed a weighted average summer slide of 29%, based on the grade representation in our sample. This predicted, estimated loss is represented by the dotted green lines in Graph 2 that extend to September 1.

Graph 2: Predicted Learning Loss Due to School Closures (2019-2020)



Actual Growth for Active Users Pre-Closure represents the actual growth rate of students using Achieve3000 Literacy during the 2019-2020 school year, through March 15.

Expected Growth Benchmark represents the amount of reading growth we would expect for students not engaged in an accelerated literacy program, which is the vast majority of students in U.S. public schools.

Potential Growth for Active Users Pre-Closure represents the predicted learning gains for students using Achieve3000 Literacy for the remainder of the school year, if schools had not closed.

Halted Growth for Non-Active Users Post-Closures represents predicted growth for students who do not continue using Achieve3000 Literacy after the school closures. It shows a 28% loss of potential Lexile growth because of the school closures.

Expected Halted Growth represents students not engaged in an accelerated literacy program after the school closures. Note that these students will have achieved less growth than their peers who have used an accelerated literacy growth program.

Potential Summer Slide is shown for students using, and not using, an accelerated literacy program. Students who used an accelerated literacy program could experience a 49% loss of potential Lexile growth. Yet, they still end summer with a higher Lexile measure than students who weren't engaged in an accelerated literacy program.

Students without access to meaningful instruction after school closures could lose 49% of their potential growth by the start of next school year. This amounts to about 5 months of lost learning—a severe setback that could take years to overcome.

| Student Usage and Performance Pre- Versus Post-School Closures

Achieve3000 Literacy is an online learning platform, accessible from any computer with an internet connection. While the program is typically used by students during school hours, according to Achieve3000 data, many students have also used it from home in the evenings and weekends. When the pandemic forced schools to close, many schools implemented efforts to encourage or require usage of Achieve3000 from home. Our researchers examined patterns of usage before and after the school closures. Two time periods were analyzed: 1) the beginning of the current school year through March 15, 2020; and 2) March 16, 2020 through April 30, 2020.

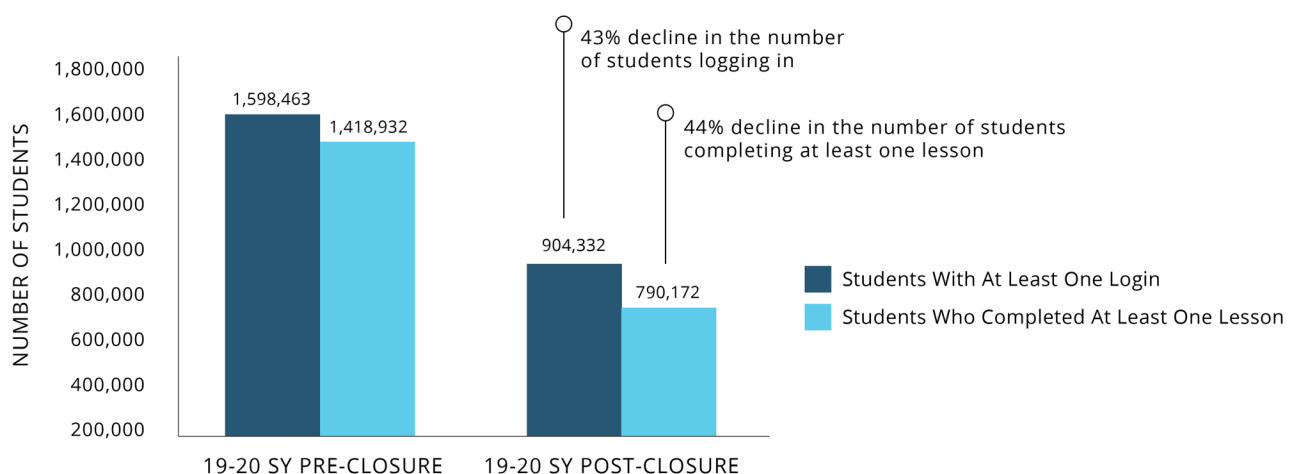
Graphs 3 through 6 show the differences between these two time periods on key indicators of usage. The metrics reported in Graph 3 compare total number of active users before versus after March 15, whereas the metrics reported in Graphs 4 and 5 compare weekly averages between students who were active users before or after March 15.

Graph 6 shows the average percent correct on all lessons completed before and after the school closures.

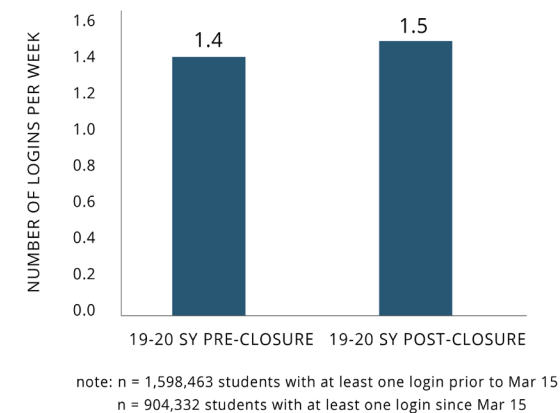
Graph 3 shows a significant drop in the number of students using the program, as measured by logins and completed lessons. The number of students logging in at least once after March 15 declined by 43%, and the number of students completing at least one lesson after March 15 declined by 44%. There are several possible explanations, any of which could contribute:

- Some schools are not implementing any online learning options during the closures
- Some schools are implementing online learning options during the closures, but not Achieve3000 Literacy
- Some schools are implementing online learning options during the closure, but many of their students are unable to take advantage of them due to lack of internet access from home

Graph 3: Number of Students Using Achieve3000 Literacy Pre- and Post-School Closure

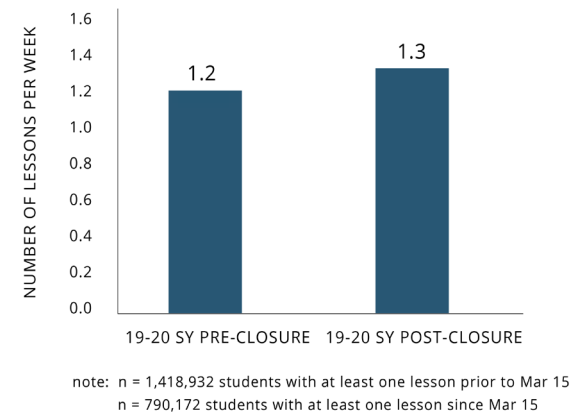


Graph 4: Logins per Week for Students With at Least One Login



The average weekly logins for students who are engaged in online learning from home is slightly higher than the average weekly logins for all students prior to the school closures.

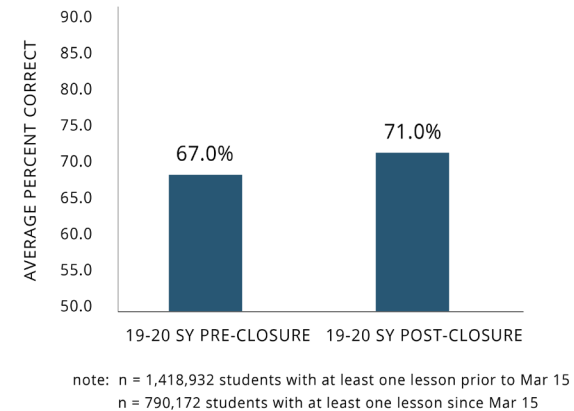
Graph 5: Number of Lessons Completed per Week for Students With at Least One Lesson Completed



The average weekly completed lessons for students who are engaged in online learning from home is higher than the average weekly completed lessons for all students prior to the school closures.

Logins and lessons completed are measures of how often students use the program, whereas average first-try score on the assessments embedded within each lesson is an indication of the level of engagement in the program. ² Graphs 4 through 6 show that students who are actively using Achieve3000 Literacy since the school closures are exhibiting more engaged usage than students who were active before the closures. One possible explanation is that students using the program during the closure may have environmental advantages, such as better computer equipment or support from parents. Another possible explanation is that the students who are using the program during the closure are on average more motivated than those who are not using the program during the closure.

Graph 6: Student Performance Pre- and Post-School Closure



The average first-try score for students who are engaged in online learning from home is higher than the average first-try score of all students prior to the school closures.

² The term “average first-try score” refers to the score students achieve on the assessments that are embedded in each lesson. Students are given multiple attempts on each item in the assessments, but only their answers on first attempts are counted. The recommended target for average first-try score is 75%.

| Impact of Potential Learning Loss on The Achievement Gap

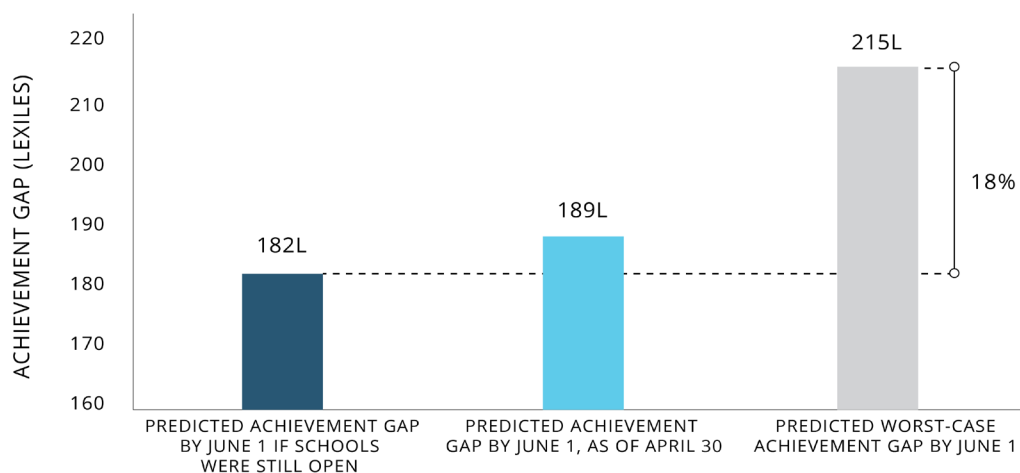
The achievement gap between students of lower socio-economic status and their more advantaged classmates is well documented (Allington et al, 2013; Reardon, 2013). We examined the data to see if the school closures are likely to widen this gap. Unfortunately, we found evidence to support this prediction.

Our student-level data file lacked demographic data, but we were able to obtain free and reduced lunch data at the school level. The proportion of students eligible to receive free or reduced lunch was computed for each school, and a tertiary split was used to categorize schools as low income, middle income, or high income. We then linked the school categories to the student file. This allowed us to analyze student data by school income category. Our assumption is that students attending schools categorized as low income are more likely to come from lower-income families than students in schools categorized as high income.

We predicted the achievement gap that would likely have happened if there were no school closures and students completed the school year as normal (the dark blue bar in Graph 7). We then calculated the achievement gap projection based on actual data through April 30 (the light blue bar in Graph 7). The gap has already begun to widen.

To estimate a worst-case, end-of-year achievement gap (the gray bar in Graph 7), we assumed that students in the high-income school category would achieve their full potential Lexile growth from March 15 until the end of the school year, while students in the low-income school category would have no growth beyond the school closures. The achievement gap under this worst-case scenario would be 18%. While the widening of the gap as of the end of April 30 appears to show that the worst-case scenario is not happening, on average, it nonetheless represents a possible outcome if school systems do not ensure that students from low-income families have the same opportunity to learn from home as their more advantaged peers.

Graph 7: Potential Achievement Gap Between Students from Low- and High-Income Schools



The potential for a widening achievement gap is real—potentially 18%—if schools do not ensure equal access to home learning opportunities during school closures

| Impact of Learning Loss on Struggling and Advanced Readers

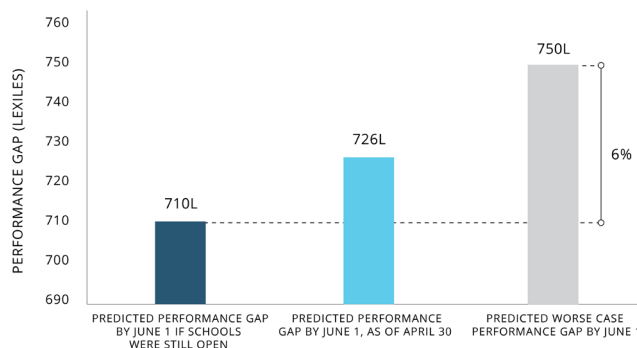
We also looked at students whose pre-test Lexile fell in the lowest and highest quartiles for their grade. The former group can be considered struggling readers, while the latter can be considered advanced readers. We conducted the same analysis as for students in low- and high-income schools.

As shown in Graph 8, the gap in performance between struggling and advanced readers has grown as of April 30, 2020 (the light blue bar). Under a worst-case scenario, the gap could grow to as much as 7% if struggling readers are not provided the same at-home learning opportunities as their more advanced peers.

Graph 9 shows that a higher proportion of advanced readers have continued in their usage of Achieve3000 Literacy during the pandemic than struggling readers. We can expect that this higher usage will lead to the mitigation of some portion of advanced readers' potential learning loss during the pandemic.

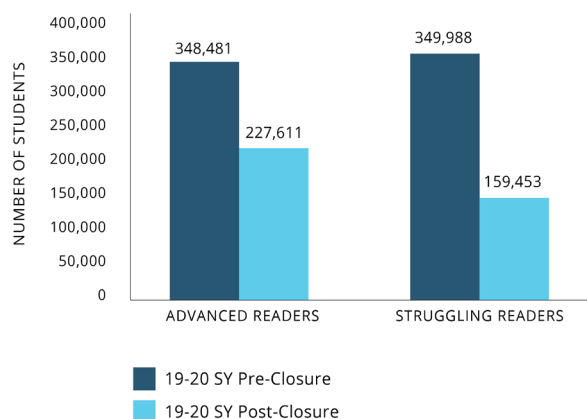
Graph 10 (see page 9) shows that a higher proportion of struggling readers come from low-income schools, whereas a higher proportion of advanced readers come from high-income schools. This suggests there is a correlation between reading ability and socio-economic status. That is, students who struggle with reading are more likely to be from a low-income family. Combined with the previous analysis, the data presented in these two graphs lend support to the conclusion that the achievement gap between low- and high-income students is likely to widen as a result of the school closures.

Graph 8: Predicted Performance Gap Between Struggling and Advanced Readers



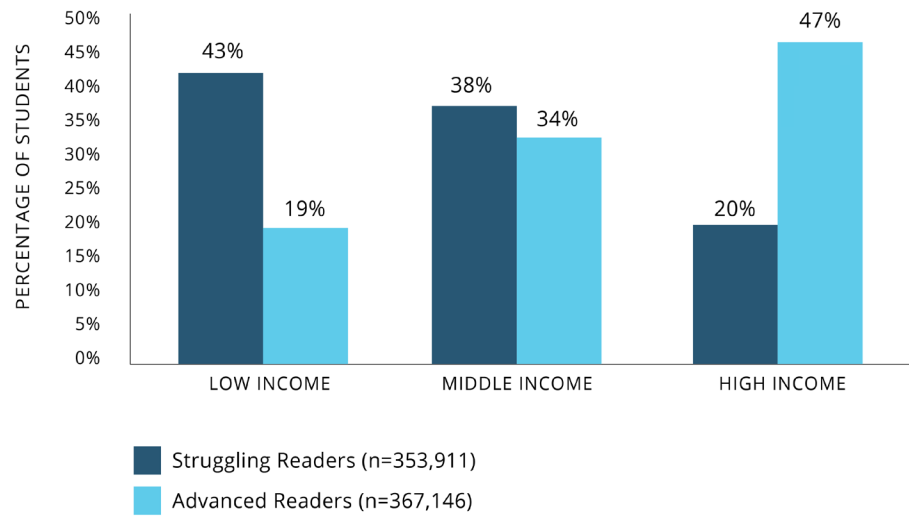
The gap between struggling and advanced readers could grow by 7% by the end of the school year.

Graph 9: Usage by Struggling and Advanced Readers Pre- and Post-School Closures



A higher proportion of advanced readers have been active since the school closures.

Graph 10: Socio-economic Status of Struggling and Advanced Readers

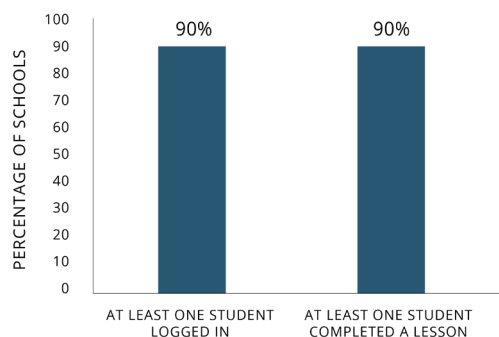


A larger proportion of struggling readers are from low-income schools, whereas more advanced readers are from higher income schools.

| Success with Remote Learning Post-School Closures

Returning to the argument that some schools may not have been successful in implementing Achieve3000 Literacy as an online learning option during the school closures, Graphs 11 and 12 indicate that schools have had mixed success in this regard. Although schools have had success in getting at least one student to log in or complete a lesson, on average they are not succeeding in getting much more than half of their students to log in and complete a lesson.

Graph 11: Percentage of Schools with at Least One Active User Since March 15

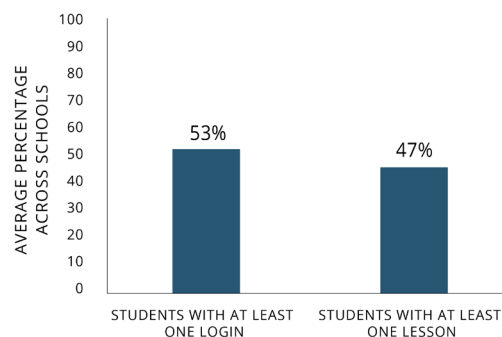


note: n = 6,134 schools with one or more students with at least one login prior to March 15
n = 5,872 schools with one or more students with at least one lesson prior to March 15

90% of schools have had at least one student log in since March 15.

Additionally, we sought to determine the level of usage at the district level after the school closures. For each school district, we divided the number of students with at least one login after March 15 by the number of students with at least one login before March 15 to get the percentage of use after the closures. Using 75% as a cut-off for indicating high usage, we found that 24.4% of districts have student usage after school closures that is close to or equal with before their school closed.

Graph 12: Average Percentage of Active Users Since March 15 for Schools With at Least One Active User



note: n = 5,489 schools with one or more students with at least one login since March 15
n = 5,304 schools with one or more students with at least one lesson since March 15

Approximately 50% of students at these schools are continuing to stay engaged.

Districts with Successful Usage

There are examples of school systems that have embraced online learning and are providing their students with experiences that are likely to prevent, or at least significantly mitigate, a slide in academic achievement during the school closures caused by the COVID-19 pandemic. The charts below show the number of students logging into Achieve3000 Literacy before and after school closures on a daily basis. The vertical red line indicates the exact date that schools shifted to remote learning.

Marlboro Township Public Schools, New Jersey

Performance	Prior to March 11	Since March 11
# of Students with at Least One Login	3,555	3,461
# of Lessons / Student / Week	1.89	1.33
Average First-Try Score	78.5	80.4
Minutes / Student / Week	48.9	44.6

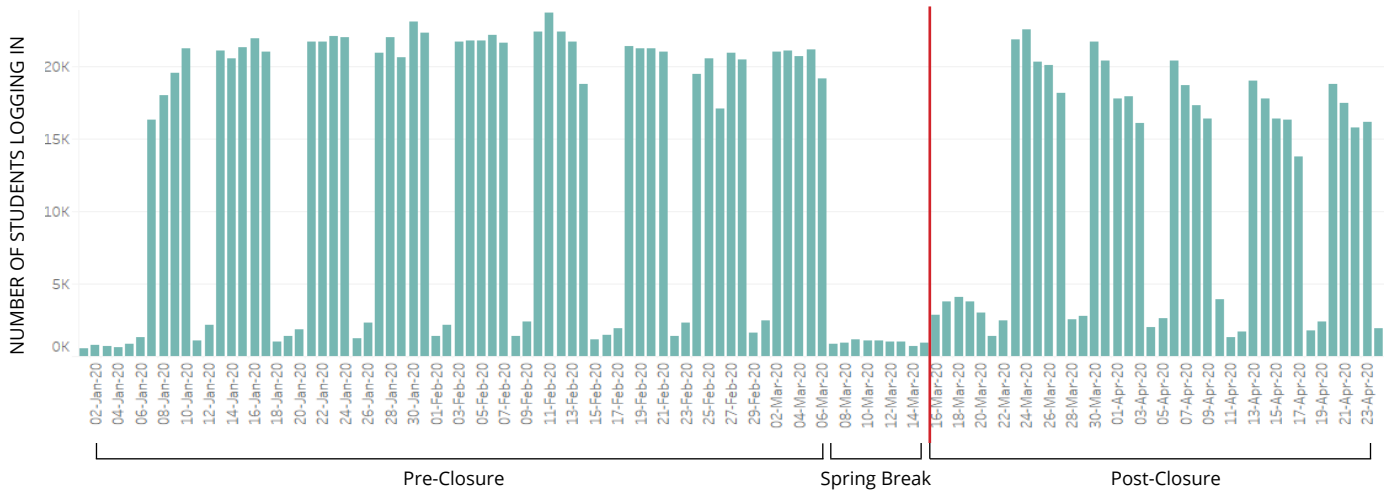


"The transition to remote wasn't really a transition because we already use the tools. Achieve3000 is embedded into the fabric of our district and schools, in everything that we do. We engage with it at every level including building and district weekly data reviews. It is part of our placement criteria for high level courses. If someone told me we had to eliminate Achieve3000, it would be like ripping off the roof of our building."

Michael Ballone
Director of Curriculum and Instruction
Marlboro Township School District

Duval County Public Schools, Florida

Performance	Prior to March 11	Since March 11
# of Students with at Least One Login	81,315	63,087
# of Lessons / Student / Week	1.25	1.24
Average First-Try Score	70.1	72.8
Minutes / Student / Week	29.3	42.1



Duval County Public Schools launched their Virtual Home Room, a website where students and families can find all of the district's resources for remote learning in one place. They wanted to maintain students' learning routine and provide a familiar approach to instruction appropriate for each grade-level. Students without devices or internet access were issued wireless hot spots as well as laptops so they could continue using the same online learning platforms they had been using before schools closed.

Irving Independent School District, Texas

Performance	Prior to March 11	Since March 11
# of Students with at Least One Login	15,574	11,982
# of Lessons / Student / Week	0.54	0.96
Average First-Try Score	64.0	67.9
Minutes / Student / Week	18.0	32.9



“The transition to online learning was somewhat seamless for us. At the onset of online learning, our district coordinators worked closely with the Achieve 3000 team to provide daily ongoing 1:1 teacher support to help alleviate anxiety of using the digital platform. As we transitioned further, the district’s curriculum and instruction team collaborated with teachers across the district to connect activities to help increase and maintain engagement. As data has been shared and growth has been observed, teachers who were formerly reluctant or who used the product on a limited basis, have begun to use the platform with great success.”

Tina Bynum- English Language Arts Coordinator PK-12
Irving Independent School District, Texas

Conclusions

This analysis of data from a major online learning platform has provided several important insights about the online learning experience in the United States since the start of the COVID-19 pandemic:

1. School closures could lead to a loss of potential learning gains, which we quantify as roughly 28% by June 1 and as much as 49% by the start of the next school year (assuming schools open on their regular start dates).
2. It is already clear that struggling readers are not using online learning as frequently as advanced readers, placing them at risk of falling further behind. Based on our data, the gap between struggling and advanced readers could grow by up to an additional 6% because of school closures. But we also found evidence that the performance gap, on average, is widening less than the worst-case scenario, meaning that some struggling readers are taking advantage of at-home learning opportunities.
3. The achievement gap has already widened in weeks. We predict that the achievement gap between students from low- and high-income schools could increase by as much as 18% for low-income students without any learning activity during the school closures. Fortunately, we also found evidence that the achievement gap, on average, is widening less than the worst-case scenario, meaning that some low-income students are remaining active in their schoolwork from home.
4. Schools differed widely in how quickly and how well they made the transition to online learning. Our usage data shows that about one quarter of districts (24%) continue to show high student usage after the closures that is close to or on par with their usage prior to closing. Overall, however, there is evidence of a serious decline in student usage (43% fewer students logging in to Achieve3000 Literacy, and 44% fewer students completing a lesson).
5. Despite the challenges, there are success stories. We found examples of districts who transitioned almost seamlessly between school-based and online instruction. For these districts, levels of usage of Achieve3000 Literacy after the school closures looks very similar to usage before the school closures.

About this Research Brief

This research brief is a collaboration between Successful Practices Network, Center for College & Career Readiness, and Achieve3000. The Successful Practices Network (SPN) is a not-for-profit organization dedicated to bringing schools and districts the most up-to-date resources and assistance to achieve success by design. The Center for College and Career Readiness is a not-for-profit training and research organization currently focused on maximizing individual learner engagement through advanced neuroscience research. Achieve3000 is a leading EdTech solutions provider delivering a comprehensive suite of proven effective digital solutions that accelerate literacy and deepen learning across the content areas.

Authors

Raymond J. McNulty is the President the Successful Practices Network and of the National Dropout Prevention Center. He is also a Senior Fellow to the International Center for Leadership in Education. Ray recently served as Dean for the School of Education at Southern New Hampshire University.

Kevin E Baird serves as chairman at the non-profit Center for College & Career Readiness, is a Wingspread Scholar, a Beinecke National Scholar, and serves as a member of the Achieve3000 academic cabinet as CAO. Mr. Baird is co-author of the just-released book *Whole: What Teachers Need to Help Students Thrive* (Wiley, 2020).

Stuart Udell is the CEO of Achieve3000. Stuart currently serves as a board member at the Successful Practices Network and its National Dropout Prevention Center division, Future of School, USA Test Prep, and Ventris Learning.

Deep Sran, Ph.D. is the Senior Vice President of Learning at Achieve3000. Dr. Sran co-founded Actively Learn where he served as Chief Academic Officer and Chief Counsel. He also opened Loudoun School for Advanced Studies in 2008 in Ashburn, Va.

Steve Tardrew is the Vice President of Assessment and Research at Achieve3000. Steve has over 22 years of experience in educational technology, directing efficacy research efforts and leading product development in the areas of assessment, analytics, and reporting.

Greg Gunn, Ph.D. is Education Examination Analyst at Achieve3000. Greg holds a Ph.D. in Social Psychology and has served as a college instructor of various courses, including research and design, statistics, and psychometrics.

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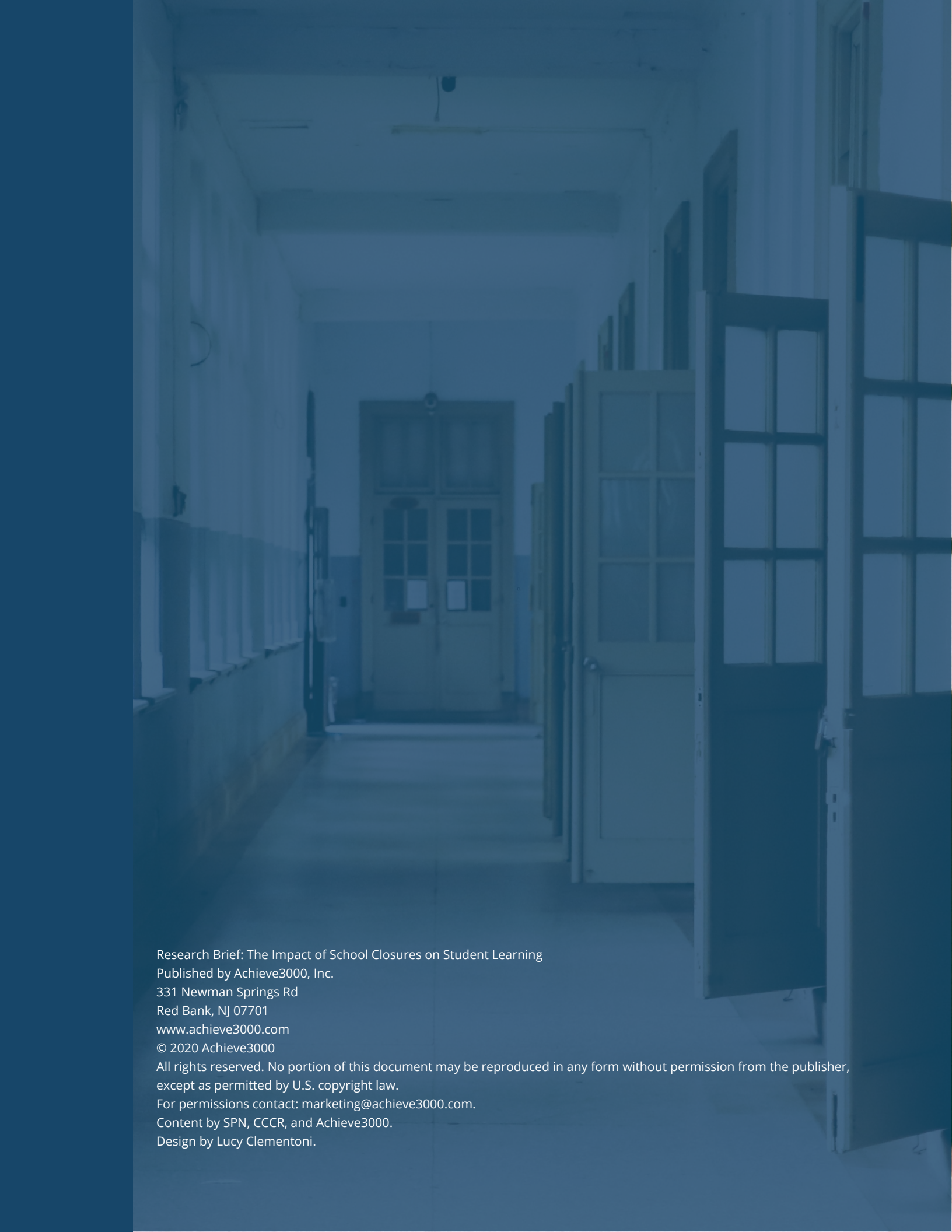
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A blue-tinted photograph of a school hallway. The hallway is long and narrow, with a series of open doors on the right side. The doors are white with multiple glass panes. The floor is light-colored, and the walls are white. The perspective is from the end of the hallway, looking down its length.

Research Brief: The Impact of School Closures on Student Learning

Published by Achieve3000, Inc.

331 Newman Springs Rd

Red Bank, NJ 07701

www.achieve3000.com

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Design by Lucy Clementoni.