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Learning Loss in the Wake of the COVID-19 Pandemic

New longitudinal study of 2,250,000 students by Cambium Assessment

Background

There are many aspects to the economic, health and educational harm driven by the COVID-19 pandemic. The alarming educational impact of the pandemic on children is well established. For example, the American Federation of Teachers[1] and the National Education Association[2] are documenting and warning about massive teacher and staff shortages. The Office of Civil Rights[3] is tracking the widening inequity and educational gaps between systemically underrepresented and disadvantaged children exacerbated by the pandemic.

The scale of the pandemic could potentially have adverse lasting effects on children that will unfold over the next decades. Cognitive, social and emotional problems could persist for years, especially in the most vulnerable children[5]. The economic fallout for the cohort of students affected by the pandemic could mean lower rates of college completion and lower earnings over their lifetime[6].

The data contained herein shows that students fell behind in the wake of the COVID-19 pandemic and learning loss recovery has only been partial. This contrasts with what would have been expected under normal circumstances. Data from the National Assessment of Educational Progress (NAEP) shows gradual improvements in the percent proficient at the national and state level over several decades prior to the pandemic (see https://www.nationsreportcard.gov/reading/nation/achievement/?grade=4). Therefore, we would have expected slightly improved performance in 2021 and 2022 if the pandemic had not occurred.

Learning Loss for the Overall Population

What happened to the educational achievement in the generation of children affected by the COVID-19 pandemic? A new longitudinal study by Cambium Assessment addresses this question by examining the educational performance in English Language Arts (ELA) and mathematics for three cohorts of students starting in 2019 (the academic year just prior to the pandemic). The three cohorts were grades 3–6, grades 4–7 and grades 5–8. The same students were tracked across four grades and tested each year (except 2020 when all testing around the country was canceled). Five states were included in the study with over 2,250,000 students. The aggregate of the five states is reported here. Cambium Assessment tests were administered in the following years:

- Grade 3 (2019), Grade 5 (2021) and Grade 6 (2022)
- Grade 4 (2019), Grade 6 (2021) and Grade 7 (2022)
- Grade 5 (2019), Grade 7 (2021) and Grade 8 (2022)

In 2019, the percent of students scoring on grade level (i.e., the percent at and above proficient on the state accountability assessment) in ELA was 61% for grade 3, 59% for grade 4, 58% for grade 5. In math, it was 64% for grade 3, 57% for grade 4 and 39% for grade 5. These percentages scoring on grade level serve as the baseline for the longitudinal study. Under normal circumstances, we would expect the percent on grade level three or four years later would be higher or at least the same as in the base year. However, the data from the longitudinal study showed that students in 2021 had fallen behind in the wake of the COVID-19 pandemic and only partially and differentially recovered in 2022.

The main findings from the Cambium Assessment longitudinal study are reported in Table 1. For ELA:

- In 2019, 61% of the grade 3 students were reading and writing on grade level. By 2021, the grade 3 cohort dropped by -6% in grade 5 to 55%;
- In 2019, 59% of the grade 4 students were reading and writing on grade level. By 2021, the grade 4 cohort also dropped by -5% in grade 6 to 54%;
- In 2019, 58% of the grade 5 students were reading and writing on grade level. By 2021, the grade 5 cohort dropped by -8% in grade 7 to 50%.

The drop in mathematics was much larger. For mathematics:

- In 2019, 64% of the grade 3 students were doing on grade level mathematics. By 2021, the grade 3 cohort dropped by -16% in grade 5 to 48%;
- In 2019, 57% of the grade 4 students were doing on grade level mathematics. By 2021, the grade 4 cohort dropped by -21% in grade 6 to 36%;
- In 2019, 39% of the grade 5 students were doing on grade level mathematics. By 2021, the grade 5 cohort dropped by -15% in grade 7 to 24%.

The general finding in 2021 compared to 2019 is that the number of students who are reading and writing on grade level dropped, representing learning loss ranging from -5% to -8%. An even more substantial drop, from -15% to -21%, was observed for on grade level mathematics. The drop in ELA performance is concerning, but the drop in mathematics is alarming. For example, in the grade 5 cohort, after the pandemic in 2021, less than a quarter of the cohort were proficient in math and doing on grade work in grade 7.

Table 1
Percent Proficient on Grade Level for Each Cohort 2019 Versus 2021 for the Overall Population

	2019		2021		2021-2019	
Cohort	ELA	Math	ELA	Math	ELA	Math
3	61%	64%	55%	48%	-6%	-16%
4	59%	57%	54%	36%	-5%	-21%
5	58%	39%	50%	24%	-8%	-15%

Recovery from Learning Loss for the Overall Population

The above results can be interpreted as the educational impact, or the learning loss in the wake of the pandemic. The results are based on following three cohorts of students across three years from 2019 to 2021. Cambium also followed the same three cohorts across a fourth year with the fourth year indicating the beginning of recovery from the pandemic. Testing the same students in 2022 shows how much they have recovered and how far behind they still are two years after the start of the pandemic. The main results from the fourth year of testing are reported in Table 2.

For ELA, in 2019, 61% of the grade 3 students were reading and writing on grade level. By 2022, the grade 3 cohort dropped by -7% in grade 6 to 54%. In 2019, 59% of the grade 4 students were reading and writing on grade level. By 2022, the grade 4 cohort dropped by -8% in grade 7 to 51%. In 2019, 58% of the grade 5 students were reading and writing on grade level. By 2022, the grade 5 cohort had dropped by -7% in grade 8 to 51%. These results show that the grade 3 and 4 cohorts fell even further behind in 2022 than they were in 2021. The grade 5 cohort improved by only 1% in 2022 over 2021 but was still behind by -7% over 2019.

For mathematics, in 2019, 64% of the grade 3 students were doing on grade level mathematics. By 2022, the grade 3 cohort had not improved over 2021. There was still a drop of -16% in grade 6 to 48%. In 2019, 57% of the grade 4 students were doing grade level mathematics. By 2022, the grade 4 cohort dropped by -13% in grade 7 to 44%. In 2019, 39% of the grade 5 students were doing on grade level mathematics. By 2022, the grade 5 cohort dropped by -6% in grade 8 to 33%. These results show some recovery for the grade 4 and 5 cohorts but no recovery for the grade 3 cohort.

The general finding in 2022 compared to 2019 is that for ELA the grade 3 and 4 cohorts fell even further behind in 2022 than they were in 2021. For mathematics, the grade 3 cohort showed no improvement in 2022 over 2021. The grade 4 and 5 cohorts did show improvement in 2022 over 2021. However, all cohorts in 2022 were still behind their 2019 levels of achievement in both ELA and mathematics.

Table 2
Percent Proficient on Grade Level for Each Cohort 2019 Versus 2022 for the Overall Population

	2019		2022		2022-2019	
Cohort	ELA	Math	ELA	Math	ELA	Math
3	61%	64%	54%	48%	-7%	-16%
4	59%	57%	51%	44%	-8%	-13%
5	58%	39%	51%	33%	-7%	-6%

Learning Loss for Demographic Subgroups

The Cambium Assessment study also looked at learning loss and recovery for several demographic subgroups. The demographic subgroups, reflecting the most common identifications, included gender, White students, Black students, Hispanic students and Asian students. The percent of students scoring on grade level in each demographic subgroup in 2019, 2021 and 2022 are presented in Tables 3, 4 and 5, respectively.

Changes in on grade level performance due to the pandemic are reported in Table 6. The Cambium Assessment study considers the percentages in Table 6 to represent the *learning losses* caused by the pandemic. The entries in the cells are obtained by subtracting the entries in Table 4 from the entries in Table 3.[7] *Recovery from the learning loss* are the percentages in Table 7. The entries in the cells are obtained by subtracting the entries in Table 5 from the entries in Table 3.

Gender differences in Table 3 (which is the base year of the study) are similar to other widely found results with male students outperforming female students in mathematics and female students outperforming male students in ELA in all three grade cohorts. In Table 4, we see that the gender differences largely remain the same two years after the start of the COVID-19 pandemic. However, as shown in Table 5, three years later , female students had largely caught up with male students in mathematics, but male students continued to lag behind female students in ELA performance.

In all three years of data, we see other demographic differences are also similar to what is typically found in other testing results. In general, Asian students performed better than all subgroups in both ELA and mathematics, followed by White students, then Hispanic students and then Black students. In Table 4 and Table 5, we see the same demographic patterns. The COVID-19 pandemic did not change this comparative pattern. Essentially, the same demographic differences in student performance that were prevalent in the educational system before the pandemic were still there after the pandemic. For example, Black students experienced more significant [or disproportionate] percent proficient decreases than other students. They started out being the demographic the most behind in the base year of the study (2019). They also lost more learning than any other demographic due to COVID-19. So they were behind in the base year and behind in learning loss up to 2022. In fact, the demographic differences for all groups in 2019 was predictive of the demographic losses due to COVID-19.

The learning loss was greater in mathematics compared to ELA in every demographic subgroup. In addition, Asian students experienced the least learning loss of all subgroups in both ELA and mathematics. This was followed by White students, then Hispanic students and then Black students.

Table 3
Percent Proficient on Grade for Demographic Groups in 2019

	Male Students		Female Students		White Students		Black Students		Hispanic Students		Asian Students	
Grade	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math
3	59%	65%	63%	63%	67%	69%	46%	53%	59%	63%	81%	86%
4	55%	58%	64%	56%	65%	62%	46%	45%	58%	57%	82%	80%
5	54%	39%	63%	37%	66%	47%	42%	27%	55%	35%	81%	50%

[7]***Some differences may be slightly off due to rounding.***

Table 4
Percent Proficient on Grade for Demographic Groups in 2021

	Male Students		Female Students		White Students		Black Students		Hispanic Students		Asian Students	
Cohort	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math
3	51%	50%	58%	47%	62%	57%	38%	31%	53%	47%	81%	78%
4	50%	36%	58%	37%	60%	45%	36%	20%	53%	34%	81%	64%
5	44%	26%	55%	21%	56%	35%	33%	9%	47%	18%	79%	38%

Table 5
Percent Proficient on Grade for Demographic Groups in 2022

	Male Students		Female Students		White Students		Black Students		Hispanic Students		Asian Students	
Cohort	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math
3	49%	48%	59%	49%	60%	55%	38%	31%	53%	48%	81%	81%
4	46%	46%	56%	43%	56%	52%	34%	27%	50%	45%	80%	73%
5	47%	33%	56%	33%	57%	39%	35%	21%	51%	33%	79%	53%

Table 6
Change in Percent on Grade for 3-Year Cohort for Demographic Groups (2021-2019)

	Male Students		Female Students		White Students		Black Students		Hispanic Students		Asian Students	
Grade	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math
3	-8%	-15%	-5%	-16%	-6%	-12%	-9%	-22%	-6%	-17%	0%	-8%
4	-6%	-22%	-6%	-19%	-5%	-17%	-10%	-25%	-5%	-23%	0%	-15%
5	-9%	-13%	-8%	-16%	-10%	-12%	-9%	-19%	-7%	-17%	-2%	-12%

Recovery from Learning Loss for Demographic Subgroups

Table 7 reports on the learning loss two years after the pandemic began. The entries in the cell are obtained by subtracting the entries in Table 5 from the entries in Table 3. By 2022, we see some recovery in student performance. This is indicated by the fact that the entries in Table 7 are smaller than those in Table 6.

Two years after the start of the pandemic, there is still learning loss, except for the Asian student cohort. Asian students continued to have the least learning loss of all subgroups in both ELA and mathematics two years after the pandemic began. This was followed by White students, then Hispanic students and then Black students.

Table 7
Change in Percent on Grade for 4-Year Cohort for Demographic Groups (2022-2019)

	Male Students		Female Students		White Students		Black Students		Hispanic Students		Asian Students	
Grade	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math
3	-10%	-17%	-4%	-14%	-8%	-14%	-8%	-22%	-6%	-15%	0%	-5%
4	-10%	-13%	-8%	-13%	-9%	-11%	-12%	-18%	-8%	-12%	-2%	-6%
5	-7%	-6%	-7%	-4%	-8%	-7%	-7%	-6%	-4%	-2%	-1%	3%

Conclusion

This paper reports the results of a Cambium Assessment longitudinal study that followed three cohorts of students beginning in 2019 (one year prior to the COVID-19 pandemic) until 2022 (two years after the start of the pandemic). The intent of the longitudinal study is examining the learning loss in the wake of the pandemic. The study involved five states with over 2,250,000 students with three cohorts beginning in grades 3, 4 and 5. The study used the percent of students functioning on grade level as the main variable. This is operationally defined as the percent of students that are at and above proficiency on the state accountability test. The main findings of the study were:

- One year after the pandemic began, the learning loss is greater in mathematics than English Language Arts (ELA). The drop in ELA is concerning but the larger drop in mathematics is alarming.
- Two years after the pandemic began, the learning loss is still present with math being greater than ELA. The loss worsened in ELA, stayed about the same in the grade 3 math cohort, but improved somewhat in the grade 4 and grade 5 cohorts in mathematics.
- The study looked at demographic subgroups: gender, White students, Black students, Hispanic students and Asian students.
    - Gender differences in the base year of the study were similar to other widely found results with male students outperforming female students in mathematics and female students outperforming male students in ELA in all three grade cohorts. These gender differences largely remain the same two years after the start of the pandemic. However, three years after the initial COVID-19 disruption, female students had largely caught up with male students in mathematics, but male students continued to lag behind female students in ELA performance.
    - In 2019, Asian students had the largest percent of on grade level performance in both ELA and mathematics. This was followed by White students, Hispanic students and then Black students. This same order persisted in 2021 as well as 2022. In other words, the demographic differences that we typically see were still present after the learning losses in 2021 and rebound in 2022.

The Cambium Assessment study has important implications for educators. First, it is a truly longitudinal study tracking three cohorts over four years. Therefore, data from the study should be substantially more reliable than many previous cross-sectional studies. Secondly, the study shows that two years after the start of the pandemic, there are still learning losses. In other words, the students are still falling further behind. After one more year of instruction, will the country catch up to where it was prior to the pandemic?

References

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[3]Office of Civil Rights, June 9, 2021. *Education in a Pandemic: The Disparate Impacts of COVID-19 on America's Students.*

[4]The World Bank, April 2, 2021, *The Impact of COVID-19 on Education – Recommendations and Opportunities for Ukraine.*

[5]Binner, A. D. and Mistry, R. S., (December 2010), *Child Development During the COVID-19 Pandemic Through a Life Course Theory Lens, Volume 14, Pages 236-243.*

[6]Dorn, E, Hancock, B, Sarakatsannis, J and Viruleg, E., July 27, 2021, *COVID-19 and education: The lingering effects of unfinished learning, Mckinsey & Company.*