The Pace of Recovery after COVID

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Introduction

There is no dispute we are in unfamiliar waters when it comes to designing and implementing solutions to the pandemic's impacts on learning. Since 2020, the COVID-19 pandemic has demanded unprecedented efforts from educators, administrators and policy leaders. Nonetheless, learning losses were nearly universal and, in many communities, devastating. The results from the National Assessment of Education Progress (NAEP) show regression to pre-NCLB years.[i] For the significant share of the student population already under-educated throughout their years of schooling and unprepared for post-secondary opportunities, these losses are crippling. Across the country, the academic needs of students are not well served by prevailing practices of K-12 schools, such as grade level assignments or the use of Carnegie Units to award course credit.

The need for remedies and recovery applies to all levels of K-12 public education. As demonstrated below, the most widely used solutions will not diminish our students' learning deficits. Most interventions in current use are dosage solutions that cannot adequately address the needs of students because they fail to factor in the pace at which students learn or how much the pace varies. This oversight distorts the potential value of the prevailing interventions that add teaching time at the margin. It also obscures better chances for success that focus on changing the rate at which students learn.

This brief summarizes a larger meta-analysis of sixteen states.[ii] Here, we present empirically grounded estimates of the recovery horizon and provide new criteria for gauging the likely returns from policies and programs aimed at restoring student learning.

Estimating the Recovery Horizon

Decisions in public education generally assume that students will acquire roughly the same knowledge from the same investment of resources. Policy conversations almost always focus on attainment and progress, both of which are outcomes. Little attention has been paid to the process that links them; namely, the pace at which students learn. Below, we show that this dimension has an important role to play in COVID recovery and other critical policy decisions.

Even before the pandemic, students advanced at different rates. For discussion purposes, assume that a school year consists of 180 days of instruction. This means that each student experiences 180 days of potential learning. As illustrated in Figure 1, by the end of the academic year, some students will have progressed more than one year's worth of learning, while others may not have gained a full year's worth. This is attributable to several factors, such as family backgrounds, disparities in teaching quality and mismatches between student needs and instructional methods; however, the precise contributions of these variables can vary.

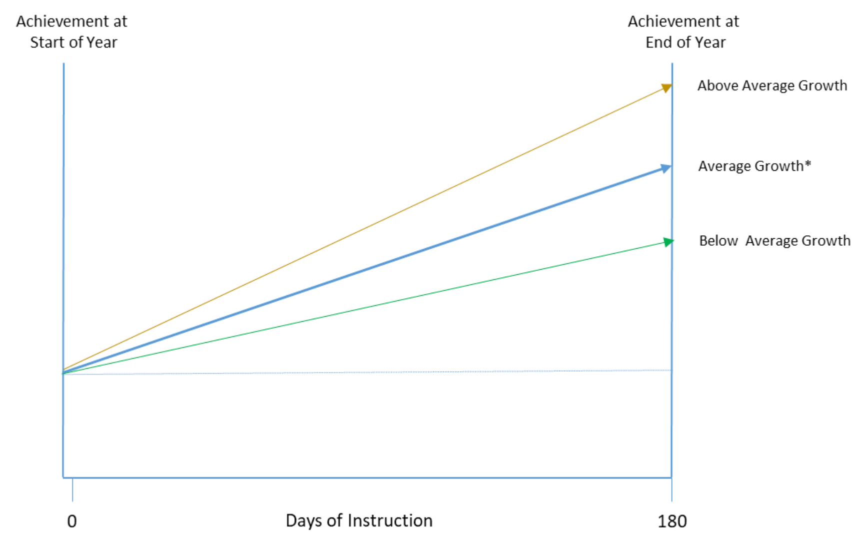
By examining a student's history of academic achievement from year to year, we can calculate the rate at which they improve. This rate is referred to as the student's pace of learning (POL). Mathematically, this is calculated by measuring the slope of the line drawn between two achievement points. In Figure 1, for example, we see three lines – one green, one blue, and one tan – each having a different slope and thus representing a different POL. The green line has a shallower slope than the blue or tan, indicating a below-average POL. The blue line is of an average POL, and the tan line has the steepest slope, showing an above-average POL.

An immediate implication of differences in POLs is that educational programs will only result in learning that is on par with a student's POL. For example, if a district offers ten days of additional instruction to their students, the average student will realize ten more days of learning but the student with the green line would have smaller gains. Much of the policy discussion about COVID remedies fail to consider this inference.

This simplified picture also ignores the fact that students start at different points, depending on their prior learning. If the starting point is positively related to the student's pace of learning, we would also see a widening of this distribution over time.

Figure 1
Schematic of Student Pace of Learning

The slope of each line equals the Pace of Learning that results in the observed magnitude of growth.



* Average growth in each subject/grade is equated to 180 of learning for 180 days of instruction.

We can figure out each student's POLs by looking at previous student records, using two or more scores from standardized tests to calculate their estimated POL. These calculations can be used to create estimates of the recovery horizon nationwide.

Spring 2022 assessments across the states showed typical learning loss from COVID in the 60 to 90-day range; these are the values used in this recovery analysis. For each student, we can factor their post-COVID achievement and then “run the clock” forward, adding each student’s POL for every post-COVID year a student is in school, to see what the student’s academic achievement looks like at the end of twelve years of schooling. We adopt the 50th percentile of 12th Grade achievement as the benchmark goal for this analysis. (See Sidebar 1 for three examples of this methodology.) The student’s grade level at the start of the pandemic affects the length of time available to remediate the learning loss.

SIDEBAR 1. Examples of Pace of Learning

Independent of COVID, students demonstrate different amounts of learning over a school year, accumulating over time.

The Average Student gains 180 days of learning for each 180-day period of instruction. Every year, they realize 100% of potential learning. At the end of twelve years of schooling, they have achieved twelve years of learning.

The High Achiever makes above-average progress each year. In this example, for every 180-day period of instruction, a student makes 220 days of progress or 40 days more than the average student. With that POL, the High Achiever reaches the 12-grade benchmark of achievement either ahead of his peers or has substantial additional learning at the end of twelve years of schooling.

The Low Achiever makes less progress each year than the average student. If this student only achieves 150 days of learning each 180-day period of schooling, the 30-day shortfalls in learning add up over time. By the end of twelve years of schooling, the student has achievement that is well below the Grade 12 benchmark.

For brevity, we only present the results for reading in Table 1. (The results for math showed slower recovery and appeared in the full meta-analysis.) The base case of “no loss” shows how student outcomes would have turned out in reading had COVID not happened. (It also applies to cases where the pandemic did not affect students.) As seen in Column 2, the status of students after 12 years of schooling under the no-loss scenario shows that about 68 percent of students end their K-12 years having met the benchmark of average 12th grade achievement. When 60 days of learning loss are added to the scenario, only 65 percent of students will be on par at the end of 12-years of schooling. If 90 days of learning losses are considered, the share of students meeting the 12th-grade benchmark falls to 64 percent.

Table 1
Share of Students Meeting Reading 12th Grade Benchmarks by Level of Learning Loss

Column 1	Column 2	Column 3
Learning Loss (duration)	Percent reaching 12th Grade benchmark in 12th Grade	Percent reaching 12th Grade Benchmark with 3 additional years of instruction
No loss	67.7	74.3
60 days	65.1	72.3
90 days	63.6	71.1

Note: Numbers represent percentages. Each cell represents all students in each group in all participating states.

With these baselines established, we can extend the analysis by considering the impacts of additional investments in learning. Column 3 of Table 1 estimates the resulting status of each student if given three additional years of instruction. Adding three years of additional learning for the "no loss" students raises the proportion meeting the 12th Grade benchmark to 74 percent, an increase of six percentage points. With 60 days of learning loss, the share rises seven percentage points to 72 percent. With 90 days of learning loss, the share grows by six percentage points to 71 percent.

Table 1 delivers two important insights. First, the impact of learning loss will persist with or without substantial additions of instructional. In the best of cases, one-quarter of students remains undereducated. Second, the amount of change between no intervention and three more years of schooling is consistent across the three scenarios of loss –6.5 to 7.2 percentage points – lends support to the role that POL plays in student results.

It bears noting that these findings show average results for the entire sample of states. The states' averages spread around these group averages roughly minus-three to plus-three percentage points.

Across our sample of 16 states – and likewise, within individual states- the results vary for different student groups and school characteristics. These differences give educators and policymakers deeper insights into Student needs to guide decisions. Table 2 shows the impact of POL on student outcomes for different student demographic groups. Outcomes for some student groups are less favorable due to reduced learning rates. Table 2 shows fewer students who are members of historically underserved groups meet the benchmark in every scenario compared to their more advantaged peers. Students who receive lunch subsidies, have Special Education needs, are English Language Learners, are Black, Hispanic or Native American have smaller shares meeting the 12th Grade benchmark in both the no-loss and the 90-day loss scenarios. Moreover, the magnitude of the differences with their peers is dramatic, as much as 30 percentage points in some cases. These results are consistent with the findings on how COVID affected students differently.[iii]

Table 2:
Share of Students Meeting Reading 12th Grade Benchmarks
by Level of Learning Loss and Student Characteristics

	No Losses		90 Days of Loss	
Student Group	No additional years	Up to 3 additional years	No additional years	Up to 3 additional years
Non-Poverty	77.0	81.9	73.2	79.0
Poverty	59.2	67.4	54.8	63.9
Not ELL	69.5	75.8	65.3	72.6
ELL	49.7	59.3	46.0	56.1
Not in Special Ed	71.1	77.2	66.9	74.0
In Special Ed	38.9	50.0	35.4	46.6
Asian	85.6	88.9	82.8	86.8
Black	53.7	62.8	49.4	59.2
Hispanic	62.5	70.4	58.2	67.1
Native Am.	55.4	65.0	50.7	61.2
White	74.1	79.4	70.1	76.2
Multi/Other	69.5	75.3	65.4	72.1

Note: Numbers represent percentages. Each cell represents all students in each group in all participating states.

The varying results for different student groups are associated with the schools they attend, so it is not surprising that similar patterns emerge when the analysis examines school characteristics. Table 3 presents the shares of students in different school settings meeting the 12th Grade benchmark. Across the entire sample, no real difference is seen between district and charter schools. When the locale of schools is used to group schools, differences emerge, with urban, virtual and high schools showing a lower share of students able to reach the benchmark.

Table 3:
Share of Students Meeting Reading 12th Grade Benchmarks
by Level of Learning Loss and School Characteristics

	No Losses		90 Days of Loss	
School Category	No additional years	Up to 3 additional years	No additional years	Up to 3 additional years
TPS	67.6	74.3	63.5	71
Charter	68.6	75.2	64.6	72.1
Urban	64.5	71.6	60.5	68.4
Suburban	70.7	76.8	66.6	73.7
Town	65.3	72.4	61	69.1
Rural	68.5	75.1	64.3	71.8
Virtual	62.2	70.2	57.5	66.4
Elementary School	71.1	74.5	67.5	71.5
Middle School	69.2	75.7	65.1	72.7
High School	60.6	71.7	55.7	67.9

Note: Numbers represent percentages. Each cell represents all students in each group in all participating states.

Finally, while the present analysis uses years of schooling, the relationship holds when smaller increments of additional instruction are proposed. Many current interventions deliver added instruction over hours or days, not years, so their additions to student achievement would build at the same rates but be smaller overall. The students who will need recovery support the most will have lower impacts due to their smaller POL.

Different Ways of Thinking about COVID Recovery

In the post-COVID environment, there are two different approaches to remediation.

Add instructional time to the current scheme.

Recent decisions to address the learning loss of students have focused on identifying interventions that prior to COVID were seen to improve student learning. The general approach has been to "add on" with extra programs or services to increase instructional time for students. Longer school days, extra days to the school year or intra-year infusions of instruction such as tutoring are examples of this approach, which has the effect of increasing the dosage of what students already receive. A visual way to think of this is to imagine shifting the "end of the year" axis in Figure 1 by the amount of extra instructional time students are offered.

This approach has a particularly tempting feature: the essential blueprint for school operations and instruction remains largely untouched. Schools simply do more of what they have always done.

However, the POL analysis described above illustrates several drawbacks to dosage-based solutions:

1. The primary drawback is that during the additional period of instruction, a student's prevailing POL is the best we can expect to realize. In fact, it would be wise to consider the pre-COVID POL the upper bound on newer gains. Students will add learning at the same pace as they learn under regular conditions. If a student has a historical pace of learning that is 50% of the expected gain from regular instruction, then the expected yield of additional instruction would be 50 percent as well. Thus, the students who need the extra help the most are likely to gain the least from the broad application of added learning time.
2. The math does not add up. Adding resources at the margin cannot occur at such a volume or scale that the learning loss is retired.[iv] For example, before any intervention, a 6th grade student with a POL of 50 percent and 90 days of learning loss will be at the 9th grade level at the end of twelve years of schooling. Even if he were able to realize the full benefit of tutoring over a two-year period, he would only advance a half year of achievement, leaving him far short of the 12th Grade benchmark. There are simply not enough hours of intervention possible to close the gap.
3. These interventions will be time-limited, constrained by funding, and then the system will return to its former levels of performance.
4. There are supply challenges in many of the neediest communities.[v]
5. We do not know if the impacts seen in short-term solutions hold over a longer period. We can expect extended interventions to show ceiling and taper off effects.
6. If the programs have a voluntary element, it is likely that those who least need the service will tend to get more of it, thus exacerbating the overall learning differences.

Re-engineer the Pace of Learning

If incremental additions are not adequate to the task at hand, there are other available ways to improve learning if we are to repair the adverse effects of the past few years. We can imagine two proposals.

Relax the time base of instruction.

One option is to let students progress at their own pace towards established benchmarks. High achieving students can reach them faster than we usually allow and move on to more distant goals. Students with larger POLs could complete secondary school in less time than currently required. By allowing early completion, the system can free up resources currently spent on their following time-based instructional requirements.

If we reallocate the "savings" from faster progressing students to improving the pace of learning of below average students, the overall results will improve — an increase in both effectiveness and efficiency.

This option is not without its challenges. There are important system redesign requirements for this approach:

1. There is a need to define in greater detail what the benchmarks cover. Many states have made commendable progress on defining "The Profile of a Graduate" to detail the learning and skills that students must meet to meet the standard of high school graduation.
2. Assessments of student performance must become mastery based, centered on explicit demonstrations of content knowledge and advanced cognitive and non-cognitive abilities.
3. Instructional plans must become more individualized. Many schools already use personalized learning plans to one extent or another. Learning management systems hold promise for more extensive curation and tracking of student learning. Integration with mastery-benchmarked assessments could be the key to allowing each student to progress as they are able.
4. Universal records of student mastery are needed that create common maps of knowledge and skills; this could eventually be integrated into skill maps for occupations or pathways for additional study and work.

Change the POL for students.

The most impactful way to address the problem of learning loss is to improve the rate at which students learn. In this case, we mean shifting the POL — i.e. the slope of the learning line — upwards for students.

To realize greater student learning gains, they need to receive higher quality instruction. The research is well developed that better teachers derive more learning from their students than their peers.[vi] Ensuring high quality instruction in every classroom *is* the Holy Grail for policy makers and educators alike.

We already identify the best teachers through a number of competitions; the purpose here could extend the value of these efforts. We could use the qualitative and quantitative information at hand to identify teachers with outsized impacts on students. The extensive data on student-level standardized tests is one important source of data on how much learning occurs with each teacher. Concern about variation in the mix of students from year to year smooths out if we look at a teacher's impact over a number of student cohorts. These estimates become stronger with additional assessments from principals, peers and other experts. Reliable estimates of teacher performance are well within reach; experience in Denver or Dallas or Washington, D.C. can provide important lessons.

We could then deploy high impact teachers in new ways.

One approach would be to offer incentives to motivate higher quality teachers to add students to their classes. For example, we could offer more effective teachers an additional pay for taking on additional students. Alternatively, they might earn credit for each extra student for later sabbatical or special training. Each student drawn from the lower portion of the POL distribution receives a high quality teacher and higher performing peers, both of which stimulate student performance.[vii]

Alternatively, where supply of high-need students outstrips the supply of high-impact teachers a second option is possible. For each grade, we seek out the best teacher for a given subject. For example, we could find the best 5th grade math teacher in Georgia. That teacher would receive a substantial payment to have their entire year of teaching for that subject recorded. The videos and all the supporting materials — lesson plans, worksheets, quizzes, etc. — would be digitized and posted online for other teachers to use.

We call this approach the Instructional Commons. It builds on earlier efforts to build repositories of lesson plans and class guides for teachers.[viii] The Instructional Commons offers significant benefits: a peer-to-peer training model, the opportunity for teachers to observe high quality instruction in depth, a ready resource for their own lesson planning (better than a Sunday night Google search), and a common standard for educators and administrators to employ for professional development. If adopted successfully, this approach would elevate the caliber of the existing teacher force at a relatively modest cost and without political battles.

Summary and Future Work

This briefing memo has argued four points:

1. A clearer picture of the impact of COVID on student knowledge is emerging showing widespread losses, which are hardest felt among the students that were struggling academically previously. Students, their communities and the nation critically need remedies.
2. The historical pace of learning differs widely across students. In a typical 180-day school year, some students' learning gains amount to less than a full year of learning and others realize more than a year. These differences create much longer timelines for recovery from COVID than is currently discussed.
3. Policy makers and educators have largely failed to consider these differences in choosing COVID recovery approaches. Efforts to supplement the existing modes of learning with tutoring or mentoring will yield only the historical pace of learning for students because these interventions occur at the margins of a system that otherwise remains unchanged. There are significant time and resource constraints that make it highly unlikely that students will receive enough of these programs to erase their learning deficits from COVID.
4. The path to real mitigation lies in approaches that recognize the differences in students pace of learning and either exploit them for better outcomes for all or seek to change them for the students who need the extra learning.

By changing how remedial efforts are applied and to which students, outcomes for COVID-impacted students could improve at the same time necessary improvements were realized in the K-12 system.

There is much yet to learn as more information on post-COVID student performance becomes available. Does the assumption hold that a student's historical pace of learning is predictive of future gains? Do programs of tutoring or mentoring create the magnitude of improvement that assures learning recovery? Will expanded classes taught by top performing teachers create the gains we expect for the added students? Will teachers embrace the opportunity to advance their practice if offered access to top quality instructional materials?

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[i] https://www.nationsreportcard.gov/highlights/ltt/2022/

[ii] ENTER CITE TO META ANALYSIS WHEN RELEASED

[iii] Storey, N., & Zhang, Q. (2021, September 10). A Meta-analysis of COVID Learning Loss. https://doi.org/10.35542/osf.io/qekw2

[iv] Goldhaber, D. , Kane, T., McEachin, A., Morton E., Patterson, T., Staiger, D., (2022) The Consequences of Remote and Hybrid Instruction During the Pandemic. Research Report. Cambridge, MA: Center for Education Policy Research, Harvard University

[v] https://www.ed.gov/news/press-releases/us-department-education-answers-president-bidens-call-action-spur-academic-recovery

[vi] Hanushek, Eric A. 1992. "The trade-off between child quantity and quality." Journal of Political Economy 100, no. 1 (February): 84-117.

[vii] Heck, Ronald. March 2009. Teacher effectiveness and student achievement: Investigating a multilevel cross-classified model. Journal of Educational Administration 47(2):227-249.

[viii] https://www.eduref.org/