



Reopening Schools Safely: Questions and Answers from a REL Mid-Atlantic Event

Schools across the country face difficult decisions about reopening buildings for the upcoming school year in the midst of a pandemic that has not been defeated. Even so, school buildings cannot remain closed indefinitely. REL Mid-Atlantic developed a computational model to predict the spread of COVID-19 in schools under various scenarios, using different disease mitigation strategies. In a [public webinar](#), we reviewed the model and explored questions of how to reopen school buildings without creating undue risk of a spike in COVID-19 infections. This document summarizes questions received during the webinar. Read more in this [blog post](#), [infographic](#), and [memo](#) prepared for the Pennsylvania Department of Education.

Q uestion

A nswer

The Community and Beyond

Does your model assume a community closure policy?

The model does not assume a community closure policy (e.g. limiting gathering sizes or keeping certain businesses closed) but rather a community background infection rate. The background infection rate in any given community would vary based on the interaction between the characteristics of the community (for example, population density and number of people currently infectious) and the closure policies the community has implemented.

From a public health perspective, do any of the models show a reduction in spread from in-school and community-based exposures?

Our agent-based model only simulates interactions between individual agents (including students, teachers, administrators, and bus drivers) at school or on buses. It also assumes a background infection rate in the community such that students and staff have a chance of becoming infected outside the school context (for example, from being at the grocery store or with an infected family member). The chance that a student or staff member will be infected outside school is not within the school's control. But the results of our scenario modeling demonstrate that all of the considered mitigation strategies in school reopening can reduce the spread of the virus in schools compared with what would happen if the school tried to operate without precautions.

Q uestion

A nswer

How do you suggest we generalize these results to other states?

What metrics do we need to pay attention to when tailoring these recommendations for other state education agencies?

We believe the findings are likely to be relevant across the country as a whole in any communities in which infection rates are low enough to allow the possibility of opening school buildings. We ran large numbers of simulations, systematically varying many of the key inputs, including grade level, school size, and community infection rates, to assess whether different policy interventions (scenarios B to G) might best mitigate infection spread in different kinds of schools. We found that the relative effectiveness of the different scenarios is consistent across all of the variations we examined, suggesting that the ranking of the different scenarios is likely to be the same for a wide range of different schools in Pennsylvania and beyond. States and schools should recognize, however, that even though a hybrid (part-time, small group) strategy is likely to reduce infections compared with full-time opening for all students, local characteristics will affect how much each strategy slows infections. For example, a school that starts with an average class size of 20 and cuts them in half is likely to do better than a school that starts with an average class size of 36 and cuts them in half.

Staffing and Scheduling

What is "block scheduling"?

Block scheduling is a scheduling strategy in which children attend fewer classes per day, but each class is held for a longer period of time. For example, students might have four 90-minute classes in a school day instead of six 50-minute classes. Scenario C in our model proposes this strategy for middle and high schools to reduce the number of class changes and the associated student mixing that could lead to increased transmission.

Is the part-time critical? For example, if you only have 8 to 10 children in a group, and they attend EVERY DAY is that just as safe as if they were to attend 20-40% part time? Is group size the only significant factor?

On average, the risk to an individual in the model is driven by the number of contacts, the frequency of those contacts, and the risk level of those contacts. Part-time schooling would reduce the frequency of contacts, and smaller group sizes would reduce the number of contacts, so both would lower risk of transmission. We have not evaluated a small-group scenario with students attending every day, so we are currently not able to assess how that would compare with the existing scenarios with small groups and part-time attendance.

Methods Check

Can you please provide a more detailed explanation of why you set the infection scenarios at 5 infections?

We selected the threshold of five infections because it is reasonably likely a school would be able to detect a case if five are present. We assume that to detect a case in a school, the infected individual must be symptomatic. Following existing literature on asymptomatic cases, our model assumes that half of those infected do not develop symptoms and therefore are unlikely to be detected as infected. By the time five people in the school are infected, it is reasonably likely that at least one will start to show symptoms. Because it takes time to develop symptoms, the team also considered a threshold of 10 infections: at 10 infections, the ranking of the scenarios does not change, but the relative effectiveness of the hybrid approach increases in magnitude.

Question

Answer

How small are the group sizes in scenarios E-G?

Is there an ideal teacher-to-student ratio, particularly for Scenario G?

We based group sizes for all scenarios on average class sizes in Pennsylvania schools, with an assumption that 20 percent of students opt for fully remote instruction. The group sizes in scenarios E and F (dividing the remaining 80 percent of students in half) varied between 8 and 10 students in a classroom with one teacher, and the group sizes in Scenario G (dividing the remaining 80 percent into five groups) varied between 3 and 4 students in a classroom with one teacher. We did not explore variation beyond those values. Smaller group sizes will always reduce infection spread relative to larger group sizes, but the ideal class size depends on tradeoffs of risk and costs that policymakers must assess.

How did you determine what children would be exposed to when not in schools in the part-time models?

How would the model change when you factor in other child care settings and arrangements for younger children who are not in school if parents return to work?

The model currently assumes that children and adults have a consistent rate of acquiring SARS-CoV-2 outside school. This rate does not change by scenario and therefore assumes that children do not increase their number of contacts once school starts. If hybrid approaches cause an increase in the use of group child care, however, this would reduce the effectiveness of scenarios E to G.

I am having trouble determining if the scenarios are any different from each other in a statistically significant way (whether that is using standard parametric analyses, nonparametrics, or Bayesian stats). Why did you report percentiles as opposed to confidence intervals?

Are the ranges of results due to running multiple models with stochastic parameters in them or from running models with different parameters that you tweaked yourself?

The results of each main model (scenarios A to G) and each sensitivity analysis (Tables 4 and 5) come from running 100 simulations with identical input parameters. Variation across those simulations is driven by the stochastic properties of the model itself. The results are presented as variation across simulations (instead of confidence intervals) to provide the level of uncertainty a school can expect. Conventional statistical significance is typically less relevant in simulation studies such as this one.

Q uestion

A nswer

Did your research encompass the regimen for using sanitation procedures for each scenario?

Our rapid evidence review included a review of recommended sanitation procedures proposed by the [Centers for Disease Control and Prevention \(CDC\)](#) at the time the final memo was published. We also acknowledged that schools might be able to learn from other industries (grocery stores, restaurants, and so on) to adapt additional sanitization practices that are feasible for a school context and school budget. Our modeling assumed consistent sanitation practices across scenarios so that we could directly compare alternatives. We do not have data that would allow us to simulate differences resulting from different sanitation approaches.

Looking Ahead

Will possible vaccine availability affect any of these scenarios?

Vaccine availability would affect all these scenarios because vaccinated people would be less likely to become infected. It is not clear how vaccination would alter the relative impact of the scenarios, but when a high proportion of all students and staff are vaccinated, transmission will drop substantially.

Would you recommend testing teachers and staff prior to reopening? If yes, how?

The CDC currently [discourages universal testing](#) before reopening, and testing all students would likely exceed testing capacity in most areas. Testing all teachers and staff might be within the capacity of some municipalities, but requiring testing could violate some legal and contractual employee protections, and universal testing of nonsymptomatic people presents a possibility of false positives (people incorrectly identified as infected) as well as false negatives (people who are infected but not detected). In addition, because community transmission will be ongoing this fall, it would be expected that some staff members might be negative for the virus at the time of testing who will later become infected in the community.

With agreement from local teachers' associations and based on testing capacity, however, testing all staff might provide greater reassurance that people are not infectious at the beginning of school and that reopening plans can proceed with relative safety. This approach has been adopted by some colleges and universities.

Are there strategies for managing school buses—which mix children across schools and neighborhoods and puts unsupervised kids together in a small enclosed space—that could help?

The [CDC](#) recommends physical distancing on buses, with one student per bench on every other bench, although students from the same household can sit together if needed. In addition, buses can increase ventilation by having windows open as much as possible. Students, bus drivers, and aides could also be asked to wear masks on buses to prevent transmission, even if students aren't required to wear them during the entire school day.

Another promising strategy is adopting a strategic student placement plan for students on buses by coordinating pick-up locations and reloading students onto buses at the end of the day with a first on/last off approach: the first student on the bus would go to the back and the last student would sit at the front of the bus to reduce unnecessary student contact during transportation to and from school.

Q uestion

A nswer

Is sewage surveillance something that is being considered/ explored at the individual school level?

Currently, a small number of [colleges](#) and [universities](#) are implementing sewage and wastewater surveillance at the dormitory level, and some municipalities in Minnesota and New York are implementing sewage surveillance at the neighborhood level. We are not aware of sewage surveillance implemented for K–12 schools. Sewage testing might be more feasible at a district or municipal level instead of an individual school level, but we do recommend that districts explore the possibility with local health and sewage authorities.

Remote Learning Issues

Is there evidence that providing training to parents/guardians/older sibling can improve distance learning?

This is a good question given that remote learning is likely to take place in schools across the country to some degree. Some type of training or guidance for people who will be responsible for taking on new educational roles with children might be beneficial. This did not fall in the scope of our study, however, and we are not aware of any evidence on this particular topic.

Was there a discussion about how students with disabilities will be engaged?

We discussed engaging students with disabilities in the stakeholder interview section of the study. Respondents highlighted the challenges with providing remote education to students with disabilities, particularly to these students who also might be at high-risk from COVID-19. Some proposed solutions include prioritizing the return of students with disabilities if schools and districts plan to reduce the daily student population in schools. Respondents also suggested that special education teachers could use face shields instead of traditional masks so that students can read facial expression to aid in their education.

Can you talk about the equity issues related to some teachers/students staying at home?

People with existing medical conditions should consult their doctor to assess whether returning to school will present a significant danger to them. We cannot at this time assess whether the students or teachers who choose to stay home will reflect broader inequities in health. We do believe that, on average, disadvantaged students will benefit more from in-person instruction and schools and families should carefully assess the risks of choosing remote instruction for disadvantaged students relative to the potential risks from attending school.

Could you provide recommendations regarding effective remote learning strategies?

Experts recommend prioritizing real-time synchronous instruction and encourage ongoing feedback and support for students ([Hurwitz & Malick, 2020](#); [Fitzpatrick et al., 2020](#); [CREDO, 2015](#); [Gill et al., 2015](#)). Research also suggests that effective blended learning programs include individualized content for students and seamless integration of online and classroom work ([Brodersen & Melluzo, 2017](#)). Districts and schools could invest in professional learning opportunities to help teachers engage students remotely and effectively use features and tools on remote learning platforms to complement their teaching and increase student engagement. For more information on promising practices in remote learning, see this related REL [webinar](#) and [blog post](#).

Q uestion

A nswer

Research indicates that live remote instruction works best. How would this work in practice if the teacher is alternating student cohorts, presumably having in-person instruction requirements at least 4 days a week with all virtual on the 5th day?

This is a very real challenge that each school using a hybrid approach will have to address creatively. One option would be to have some teachers (possibly those that are high risk and choose to stay home) do all the remote teaching and have others focus on classroom instruction. Schools could also repurpose staff, potentially employing administrators or teachers of non-core classes, to support either in-person or remote instruction as needed. Schools could pair a teacher who chooses to stay home with a teacher who is doing the in-person instruction so that someone is available online to administer the synchronous components and someone is in the classroom teaching the same material to those students who are attending in-person.

How would you assess learning loss and when? And when will you adjust teaching methods to suit the new reality? Should the teachers be trained on new methods and when?

We expect that assessing learning loss through ongoing formative assessments will be an important activity for schools in the fall, and responding to these assessed losses will be an important driver of teachers' instructional planning this coming school year. Although the evidence for best practices in remote and hybrid instruction is still preliminary, professional development might focus on responding to the results of assessment to address skill gaps, drawing from [existing research](#) on [data-driven instruction](#).

