A HEALTHIER FUTURE **STARTS INDOORS: K-12 SCHOOLS**

The COVID-19 pandemic has presented a massive challenge to schools. As debates on reopening take center stage, educators, parents and students are forced to weigh concerns over reductions in student learning gains, emotional effects and getting back to work with concerns of health and physical safety. But according to experts, an evidence-based approach and healthy buildings strategies can help reduce the risk of COVID-19 transmission – and turn schools into powerful tools for student health and progress moving forward.

KEY PRIORITIES

HEALTH → SAFETY AND SECURITY → EDUCATION → ACCESS TO TECHNOLOGY → FACULTY AND STAFF → COMMUNITY

THE SCIENCE OF HEALTHY **SCHOOLS**

While the current urgency around healthy indoor environments in schools revolves around stopping the spread of COVID-19, research has shown the potential impact of healthy schools to be much greater. So as we look to keep students healthy in the short term we must also harness opportunities to drive overall student health, performance and productivity through healthy building strategies.

STUDENT HEALTH

VENTILATION & HEALTH

The number of upper respiratory symptoms and high rates of missed school days were significantly associated with inadequate ventilation and dampness or moisture damage in a study of 4,248 sixth grade students from 297 schools.

(Toyinbo et al, 2016)

STUDENT THINKING

VENTILATION & THINKING

Students' attention processes are significantly slower in classrooms with high CO_2 levels and low ventilation rates.

Researchers observed a **5% decrement in "power of attention"** in poorly ventilated classrooms, roughly equivalent to the impact that a student might feel from skipping breakfast.

(Coley et al, 2007)

THERMAL HEALTH & THINKING

In university students (n=56), complex tasks such as working memory, reasoning and planning skills appear particularly **vulnerable to heat stress (75° F to 82° F)**

(Zhang & Dear, 2017)

STUDENT PERFORMANCE

VENTILATION & PERFORMANCE

Students in classrooms that received portable mechanical ventilation systems interventions performed faster and more accurately on computerized tasks.

- ↑15% Word Recognition
- ↑8% Picture Memory
- ↑2% Choice Reaction

(Bakó-Biró et al, 2011)

In a study of 70 elementary schools, 140 fifth grade classrooms and 3,109 students, math test scores **increased by 11 points per liter per second of additional ventilation** *(in range of 0.9-7.1 liters per second per person)*

Additional 12-13 points per each 1° C decrease in temperature *(in range of 20-25° C)*

(Haverinen-Shaugnessy et al, 2015)

For every 1° F increase, test scores fell by 0.2%

Taking an exam on a 90° F day versus a 75° F day would have a **12.3% higher likelihood of failing** *(equivalent to the Black-white achievement gap)*

(Park, 2016)

THE ROLE OF HEALTHY BUILDINGS IN **REOPENING**

Healthy buildings experts at Harvard's T.H. Chan School of Public Health have identified key priority areas that provide a plan for the safe reopening of schools. Risk reduction strategies fall into five key categories, with healthy buildings playing a critical role.

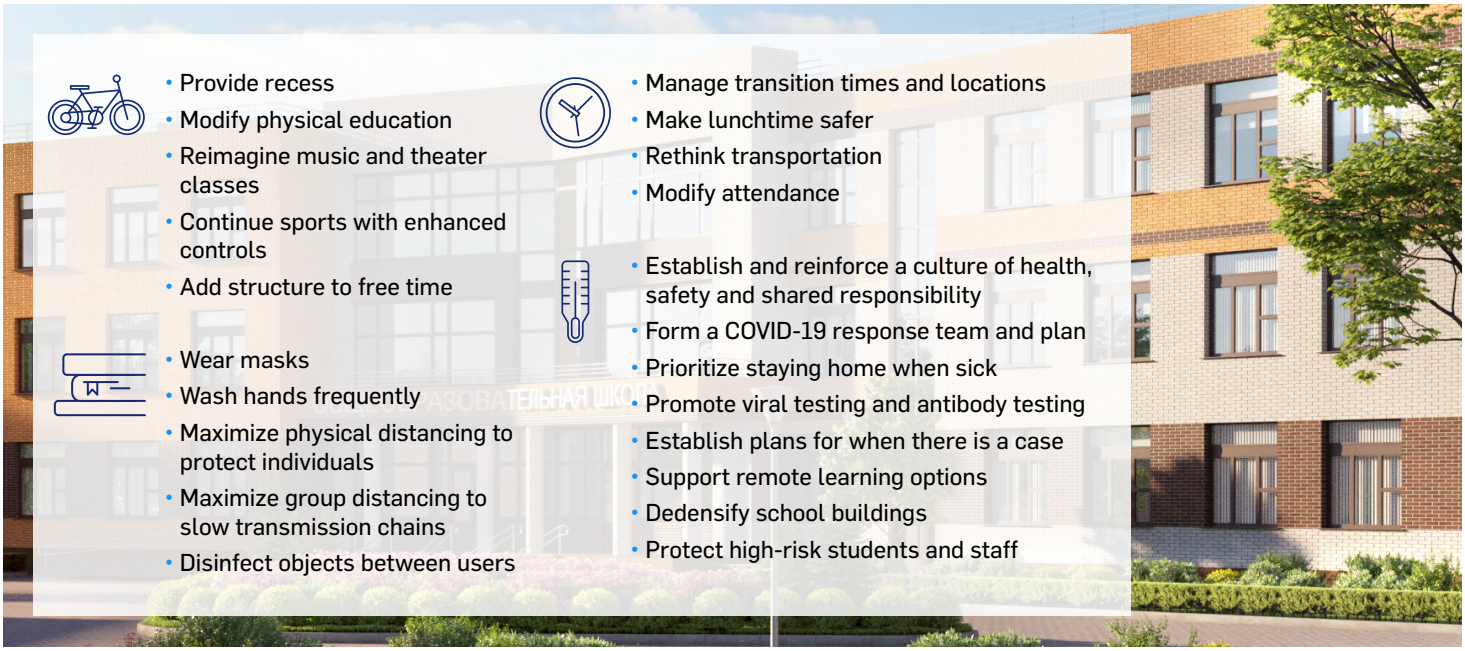
RISK REDUCTION STRATEGIES

- HEALTHY CLASSROOMS
- HEALTHY BUILDINGS
- HEALTHY POLICIES
- HEALTHY SCHEDULES
- HEALTHY ACTIVITIES

Jones, E., Young, A., Clevenger, K., Salimifard, P., Wu, E., Lahaie Luna, M., ... Allen, J. G. (2020). Schools For Health: Risk Reduction Strategies for Reopening Schools. Retrieved from https://schools.forhealth.org/risk-reduction-strategies-for-reopening-schools/

HEALTHY SCHOOLS IN **ACTION**

K-12 school operators can take a number of actions to improve indoor air quality, reduce the spread of infection and transform any school into a healthy school.



HEALTHY BUILDINGS ASSESSMENTS FOR **SCHOOLS**

At Carrier, we understand that many schools and districts are facing uncertainty with how to move forward in developing a healthy building strategy. Retrofits, modernizations and upgrades must be done with student health and safety as a top priority, while being smart about costs, budgets and future requirements. Our experts are here to help – starting with assessments across various aspects of a building.

- INDOOR AIR QUALITY
- THERMAL COMFORT
- OCCUPANCY FLOW
- BUILDING MAINTENANCE
- REGULAR HOUSEKEEPING
- ENERGY EFFICIENCY

CARRIER HEALTHY BUILDINGS **PROGRAM**

As the inventors of modern air conditioning and a world leader in HVAC, refrigeration, and fire and security solutions, Carrier has a legacy of creating safe and comfortable buildings. Now we're building on that legacy through the launch of our Healthy Buildings Program. Our experts have in-depth knowledge and experience in K-12 education and a holistic suite of healthy building technologies and services to address the immediate pandemic concerns and long into the future.

HEALTHY BUILDINGS SOLUTIONS FOR **SCHOOLS**

Carrier offers a full suite of products and services designed to help create safe and healthy environments for students and educators. The following are just a few highlights of our offering.

AIRSIDE TECHNOLOGIES

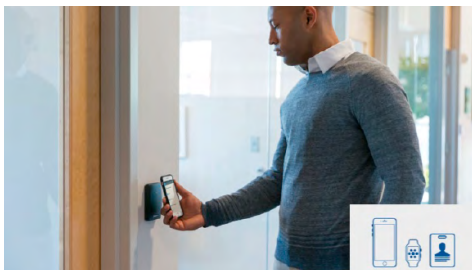
OPTICLEAN™ AIR SCRUBBER

ACTIVAIR™ HYBRID HYDRONIC AIR TERMINAL

AGION®-COATED AIR-HANDLING UNIT

TOUCHLESS ACCESS

READERS AND PHYSICAL CREDENTIALS



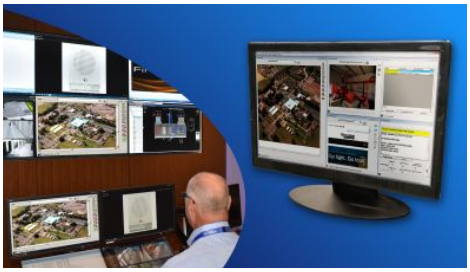
APP AND MOBILE CREDENTIALS

EXPANDING TECHNOLOGIES

FIRE SAFETY

SMARTCELL™ WIRELESS FIRE DETECTION

FIRECELL™ WIRELESS DOOR CONTROL



FIREWORKS® INCIDENT MANAGEMENT PLATFORM

GET STARTED WITH **AN EXPERT**

From a safe reopening in the coming months to ongoing enhancements to student performance, a healthier future starts indoors. Let's work together to unlock the enormous potential of healthy schools. Visit us at carrier.com/healthybuildings to learn more about our Healthy Buildings Program and connect with one of our experts.

Carrier HEALTHY**BUILDINGS**

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