



The New Standard  
for Healthy  
Classrooms: Fewer  
Sick Days, Better  
Performance

APPA Virtual Facilities Symposium | November 9, 2021  
**Jeff Wagner**, Chief of Facilities, Clark County School District  
**Eli Harris**, President and Co-Founder, R-Zero



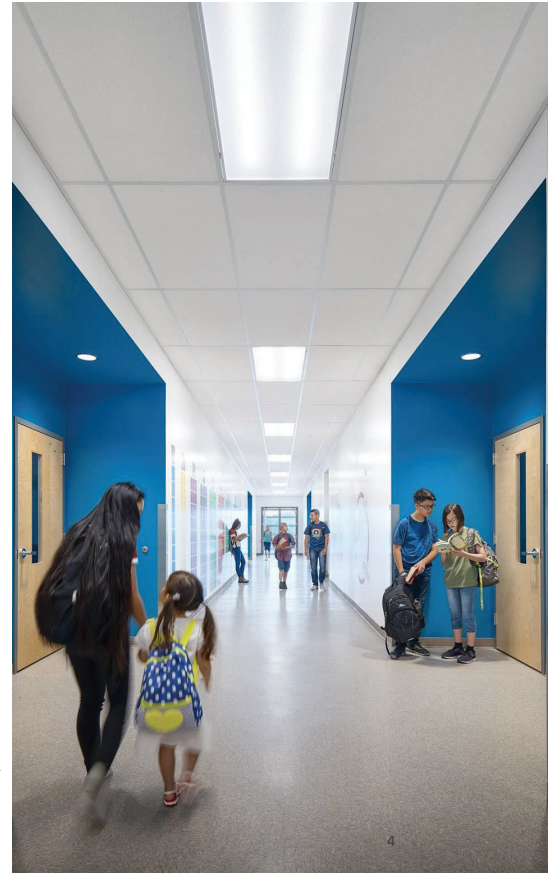
## CCSD Demographics

- Fifth Largest School District in the Nation
- 309,190 currently enrolled students
- 45 Magnet Schools, CTA Programs & Select Schools
- 370 Schools
- 44 Administrative Facilities
- 7,910 Sq. Miles of Land

**#1** **ForKids**  
**ParaLosNiños**  
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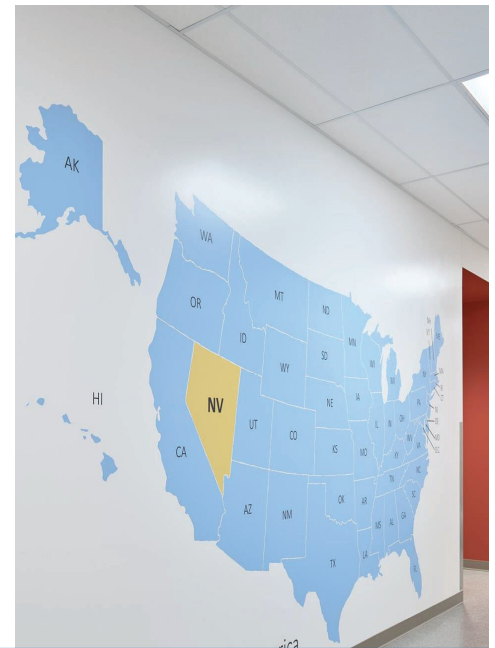
# Current Challenges

- Funding Constraints And Opportunities
  - Chronic Underfunding
  - Perception of Robust Capital Funding (fund meets approximately 50% of the need)
- Labor Constraints
  - Skilled Labor is in High Demand
  - Currently Vacancies in Facilities approaching 18%
  - Sick Days and Vacation account for another 12-14% vacancy rate each day
- Significant Growth & Aging Buildings
  - Built 33,958 elementary seats in the 2015 CIP to date
- Arid Climate
- Lack Of Standardization (Systems, Products, Procedures, etc.)
- Many Single Points Of Failure
- Thermal Comfort Issues Impact Customer Perception Of Air Quality



# Goals

- Provide the Best Environment for Every Student
- Ensure the Building has a Net Positive Impact on all Occupants
- Reduce Student Absences and Staff Sick Days
  - There is a strong correlation between attendance and student performance
  - A high-quality educator in the classroom is the number one factor in student performance
- Ensure that our Approach is Rigorous and Provides a Data-Driven Approach to Implementation
- Share Lessons Learned and Best Practices

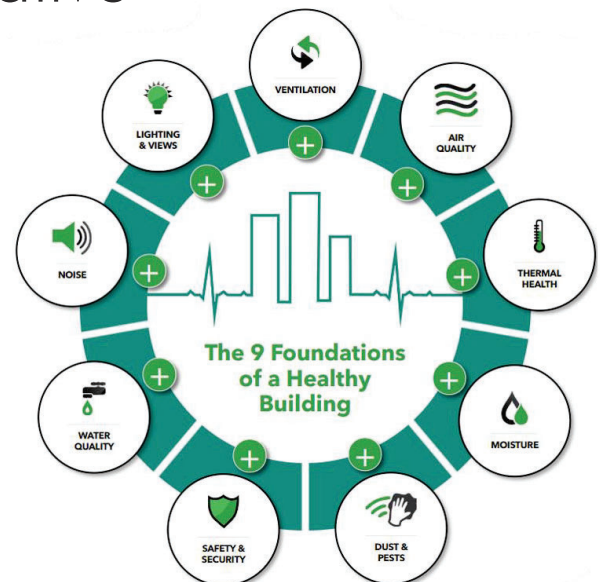


A growing body of peer-reviewed research finds a relationship between the quality of a school facility and student achievement. Specifically, significant correlations have been found between poor structural, conditional, and aesthetic attributes of school buildings and low student learning and achievement.

<https://kappanonline.org/how-crumbling-school-facilities-perpetuate-inequality-filardo-vincent-sullivan/>

# CCSD Healthy Building Initiative

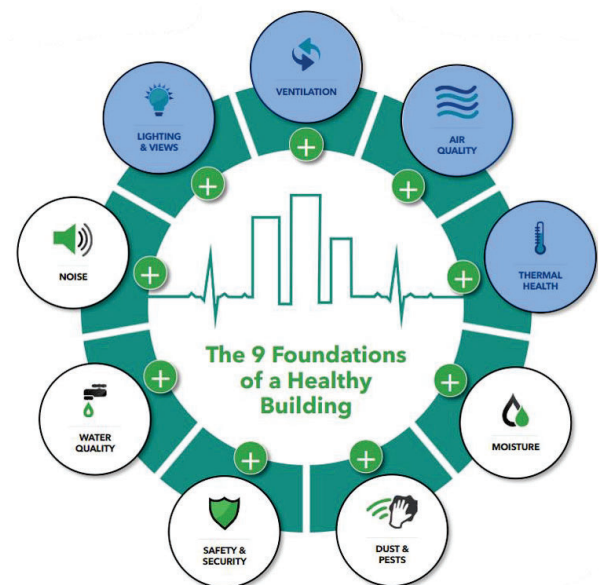
- Where to Start?
- You do not Need to Reinvent the Wheel
- There is a robust conversation taking place across the nation
  - Harvard's Healthy Buildings Programs
  - ASHRAE
  - A4LE
- Implemented By Facilities Services Unit
  - **Sustainability & Energy Management**
    - Ventilation
    - Air quality
    - Thermal health
    - Lighting & views
  - **Environmental Services Department**
    - Moisture
    - Dust & pests
    - Water quality
  - **Construction Management**
    - Impacts all categories



Source: <https://9foundations.forhealth.org/>

## Sustainability and Energy

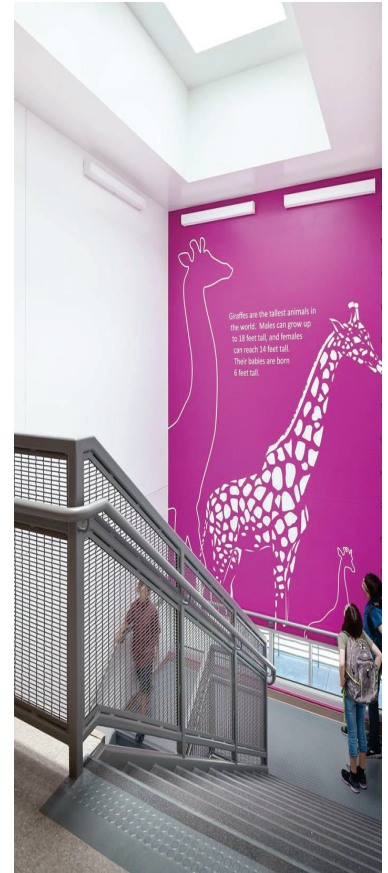
- Department Created In 2020
    - Original intent: Energy and water management, renewable energy, waste management, environmental services
    - Director: Mark Campbell
    - Evolved efforts: Healthy buildings, pest management, building design
  - Primary Healthy Building Focus Areas: Air Quality, Ventilation, Thermal Health, and Lighting
  - "Good IAQ contributes to a favorable environment for students, performance of teachers and staff, and a sense of comfort, health and well-being. These elements combine to assist a school in its core mission — educating children"
- United States Environmental Protection Agency



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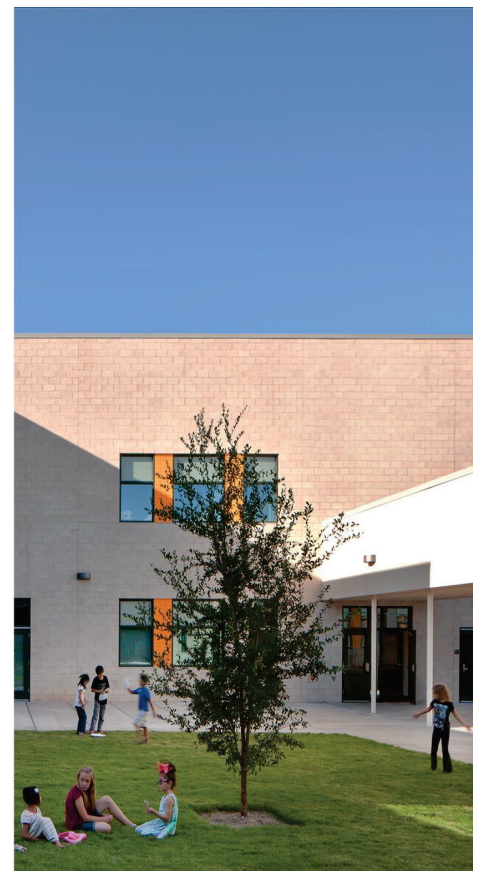
## First Steps to Improving IAQ

- CCSD's Facilities Services Unit Pushed Several Initiatives in 2019
- High efficiency (MERV-13) filter testing & implementation started Sept. 2019
- Comprehensive air handling unit coil cleaning effort started October 2019
- Carpet replacement plan developed and implemented
  - To date carpet at 240 schools has been replaced



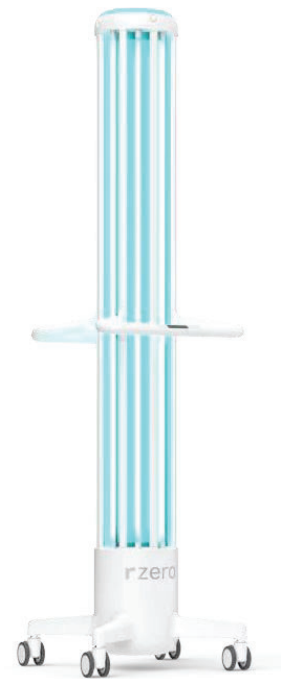
## Actions in Response to COVID-19

- Focus on the basics while navigating a workforce during a pandemic
- Replaced over 50,000 air filters, developed plan to improve replacement frequency
- Installed MERV-13 filters where possible
- Completed coil cleaning efforts at all schools – improving unit performance and IAQ
- Inspected and repaired outdoor air intakes, increased minimum outdoor air levels where possible
- Installed additional layer of defense in areas where medical care is provided



# Long-Term IAQ Strategy

- Proper Preventative Maintenance
  - Duct Cleaning
  - Coil Cleaning
  - Carpet Cleaning
- Air & Surface Testing
- Purposeful HVAC Design For Modernizations and New Schools
  - Increasing minimum ventilation levels
  - Designing for higher filtration capabilities
  - Monitoring CO<sub>2</sub> and maintaining under 800 ppm
- UVC Technology For Rapid Disinfection
  - To address an outbreak
  - Regular use in high-traffic areas and restrooms
  - Currently have 376 rZero ARC UV-C units deployed
    - One at each site



# Rigorous Data Driven Studies

## INTRO TO R-ZERO

Our goal is to make humans healthier and more productive through our hospital-grade, IoT enabled disinfection technology and products. Our products work together to form a continuous, automated disinfection ecosystem to mitigate risk of pathogen transmission in air, on surfaces, and person-to-person.

We create safer spaces in schools, corporate offices, hospitals, athletic facilities and more to reduce sick days and improve performance for people working and learning in any environment.

## TECHNOLOGY OVERVIEW

R-Zero's products are based on proven hospital-grade technologies with well-established history of reducing the spread of infectious disease in various environments. These products mitigate transmission risk through air and surfaces and generate usage data which presents a unique opportunity to perform a study with unprecedented experimental control and depth.



# Study Framework

## HYPOTHESIS

Deploying R-Zero's suite of products in Clark County Schools will improve student performance and quality of learning by reducing the spread of infectious disease (COVID, seasonal flu, common cold, norovirus, etc.) and thereby improving student, teacher, and staff attendance (lowering absenteeism rates).

## GOALS

- Study the impact of installing R-Zero products on student, teacher, and staff sick days at 4 study schools compared to 4 control schools
- Observe and record any effect on student performance as a result of enhanced disinfection and fewer sick days
- Understand the financial impact of any reduced absenteeism achieved through the study.

Scope: 8 Schools (4 "pairs")

		Study Site?	Enrollment
Group 1	Beckley	YES	823
	Ronzone	NO	796
Group 2	Treem	YES	454
	Thorpe	NO	483
Group 3	O'Roarke	YES	771
	Goolsby	NO	786
Group 4	Snyder, W.	YES	766
	Roundy	NO	697
STUDY GROUP ONLY (4 SITES)			2,814

# Study Execution

Study Director: [Dr. Eric Feigl-Ding](#), epidemiologist and public health scientist (Johns Hopkins, Harvard Chan School of Public Health)

Study Coordinator: Dr. Daniel Zoughbie, researcher and study coordinator specializing in the fields of international health and foreign policy (UC Berkeley, Stanford, Oxford)

Study Sponsor: R-Zero will provide all support necessary to assist Dr. Feigl-Ding and Dr. Zoughbie in conducting the study

## Data to collect:

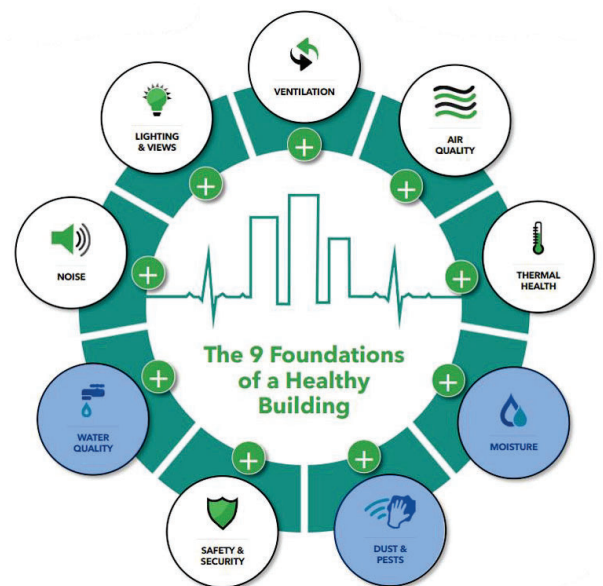
- Student and Teacher Attendance (sick days/absenteeism):** For all schools involved, Clark County to collect and provide teacher, staff, and student sick days by individual (anonymized), including school/site, date of missed day, and reason (if provided)
- IAQ, product usage, occupancy data:** Collected automatically by R-Zero's products and sensors, confirmed by periodic air and surface sampling
- Cost data (optional):** Chemical consumption costs, cost of teacher/custodial sick days, student sick days
- Other factors:** Data about policies (masks, distancing etc), hand sanitizer stations (number, placement, replenishment), and other information that may influence health and safety

# Study Timeline

- **August 18:** Chief of Facilities to review study framework with Superintendent
- **August 30:** Presentation to Cabinet
- **October 2021:** Brief Trustees
- **October 2021:** CCSD Board Approval
- **October 28: - November 1:** Installation and training. R-Zero team on site installing products  
**November 1:** Study commencement date. Begin executing study, collecting data.
- **January 2022 (tentative):** Study period ends. If not enough data exists to detect statistically significant result, then keep collecting data for 2-3 months from Jan - Mar '22.
- **February 2022:** Analysis (~1 month, finish analyses by Jan 31 '22), to be performed by study director
- **Publication (TBD, ~2nd semester)**
- **Potential phased Rollout to all Clark County Schools (TBD):** Pending study findings and reliable student performance data

# Environmental Services

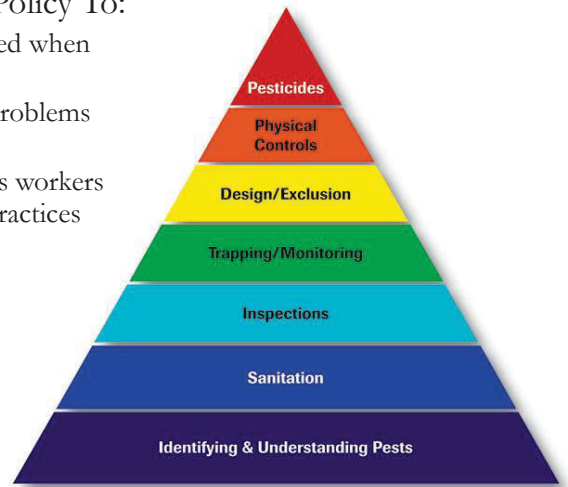
- Primary Healthy Building Areas of Focus: Moisture, Dust & Pests, Water Quality
- CCSD's Environmental Services Department delivers reliable services to ensure the environmental health and safety of students, their families, educators and staff, and the public by:
  - Handling all hazardous waste
  - Managing hazardous materials (lead, asbestos)
  - Addressing any moisture-related concerns
  - Assessing indoor air quality
  - Responding to all pest management issues



Source: <https://9foundations.forhealth.org/>

# Integrated Pest Management

- June 2021: CCSD Adopted Integrated Pest Management Policy To:
  - Implement an integrated approach to ensure pesticides are only used when necessary reducing exposure to staff and students
  - Focus on long-term prevention or suppression of pest and weed problems through economically sound measures
  - Educate teachers, custodians, food service, maintenance & grounds workers about their roles and how they can assist with implementing best practices

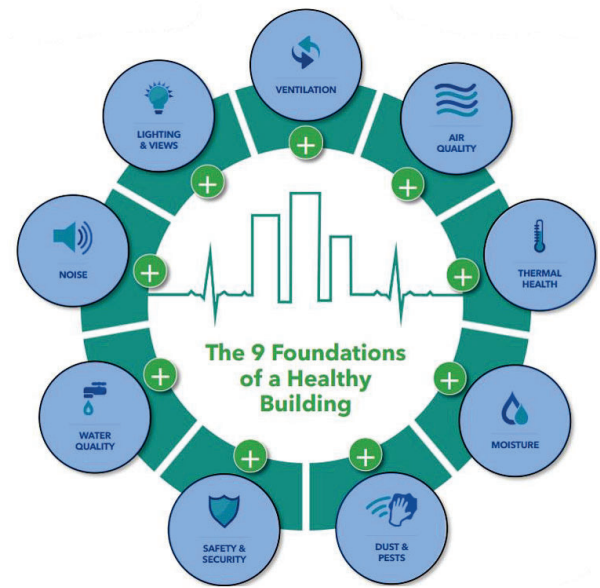


Source: <https://www.foodengineeringmag.com/>

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# Construction Management

- Construction of new and replacement facilities offers the opportunity to address all foundations of healthy buildings
- Developing new prototype designs to address the goal of healthy buildings.
- Changing the way we have **“always done it”**
  - Push both internal staff and consultants to challenge their norms
- Relying on the best experts we can find to inform the process
- Implement best long term practices and decision making driven by objective data.
- The decision that brings the most value to the student is always the right decision



Source: <https://9foundations.forhealth.org/>

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# Capital Improvement Actions

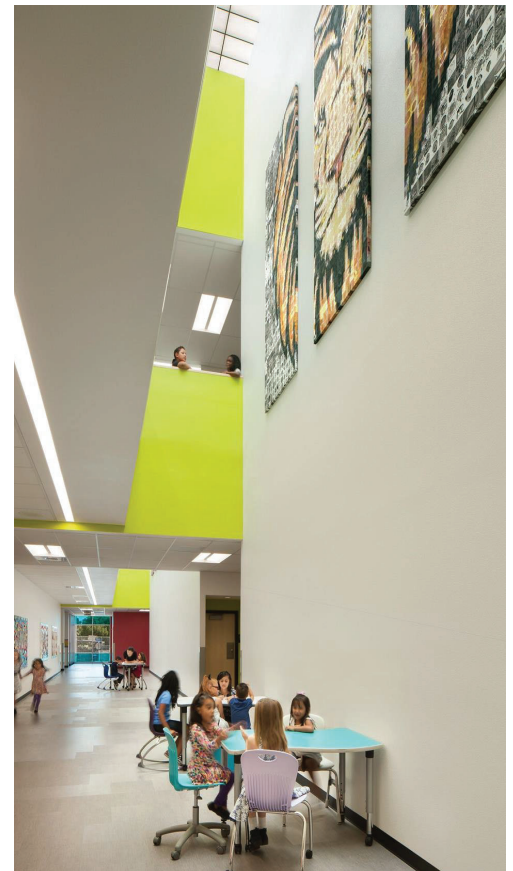
The Nevada Legislator Extended CCSD bond capacity for 10 additional years

- Expected revenue of 3.5 billion dollars
- Increased total 2015 Capital Improvement Plan resources to 7.7 billion dollars
- Total capital need from 2015-2035 is approximately 14.1 billion dollars
  - Approach has to be prioritized
- Program Moving Forward
  - Replacement of 17 elementary schools
  - Replacement of 16 middle schools
  - Replacement of the Las Vegas Academy of the Arts Magnet High School
  - Construction of 10 new elementary schools
  - Construction of 5 new high schools

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## Summary

- A Generational Opportunity to Produce Healthier Indoor Environments
  - Public awareness is at an all time high
- Facilities Play a Critical Role in the Education of our Children
  - It is our choice if that is a positive or negative impact
- Our Choices Must Support are Shared Core Mission of Student Performance
  - We need to update our metric for success
  - ROI can not only be measured in cost saved or avoided
- Healthy Buildings Benefit all Stake Holders





## QUESTIONS?

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