




Reducing Microbial Contamination in a Tennessee School District

Problem

While districts attempt to keep school environments clean, issues such as a lack of funding, overcrowding, and inadequate maintenance mean the presence of harmful microorganisms remains problematic. Additionally, the COVID pandemic has led to school closures with each surge in the virus and its variants.

Schools across the country are looking for cost-effective ways to provide peace of mind to parents, students, and staff. To that end, many schools are looking at alternatives to traditional cleaning methods that rely on harsh chemicals. They are interested in adopting protocols that raise the bar for disinfection in their buildings. R-Zero's flagship device, Arc, offers a non-chemical option for effective disinfection. To measure the efficacy and efficiency of Arc, testing took place in a large school district in Tennessee, with results provided below.

Test Location	District Location	District Size
 <p>Two school sites in district</p> <ol style="list-style-type: none">1. Elementary school2. High school	 <p>Tennessee</p>	 <p>110,000+ students</p>

Methodology

Using a two-phase study, the district chose two locations for testing:

1. **Phase 1:** elementary school (classroom selected by school principal)
2. **Phase 2:** high school (COVID-19 incident response classrooms and cafeteria selected by school principal)

For Phase 1, the classroom surfaces sampled were two tabletops and a doorknob at a 3-, 7-, and 15-foot distance from the Arc device. The surfaces were sampled before and after running a seven-minute disinfection cycle with Arc. Samples were obtained using 3M Quick Swabs following manufacturer instructions. Swabs were stored for 24 hours and then plated onto 3M Petrifilm Rapid Aerobic Count Plates. Plates were incubated for 24 hours, and then an indicator dye was used to identify bacteria colonies.



For Phase 2, the district chose to conduct exploratory interventions in the high school locations by integrating Arc into existing incident response protocols. The janitorial staff placed the Arc unit in classrooms and the cafeteria and then provided qualitative feedback on the experience.

Results

Phase 1 testing results showed an average reduction of bacterial colonies of 99 percent. After UV-C intervention, only one sample had a single detectable, but faint, colony. Specifically, two samples showed 100 percent reduction and one sample showed a 97 percent reduction. The average microbial reduction was 99% with a statistical significance of $p=0.0006$.

Phase 2 elicited positive qualitative feedback. Custodial staff noted the device's intuitive ease of use. They also appreciated that they were not unnecessarily exposed to potential bioaerosols in the incident rooms since the Arc could conduct disinfection once placed and set in the space. All incident sites (10 classrooms and 1 cafeteria) were treated in less than 45 minutes using a single Arc device.

Conclusions

Arc **effectively disinfected school spaces and enabled time-saving efficiencies** for incident management and disinfection in school environments.

ABOUT R-ZERO

R-Zero's disinfection ecosystem is an ideal solution for schools seeking to prioritize indoor environmental quality for students and staff. R-Zero's suite of thoughtfully designed technologies and science-backed protocols reduce the number of microorganisms in school buildings.

Visit rzero.com/education to learn more about our disinfection technology for your school or district.

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