

# Classroom Ventilation Recommendations



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## I. Purpose

This Classroom Ventilation Recommendations document is provided to help schools improve ventilation within their classrooms. As we have seen in multiple settings, increased or improved ventilation can reduce the risk of transmission of respiratory viruses including COVID-19. Many respiratory viruses can spread quickly through droplets that people project out of their mouth or nose when they breathe, cough, sneeze, or speak. COVID-19 and other respiratory viruses spread when an infected person breathes out droplets and very small particles that contain the virus. These droplets and particles can be breathed in by other people or land on their eyes, noses, or mouth. Improving ventilation can help your school reduce virus particles in the classroom and keep respiratory viruses from spreading.

Ventilation is an important strategy for schools and childcare programs to use in preventing the spread of respiratory illnesses. Good ventilation can reduce the number of virus particles in the air. Below are general ways that ventilation can be improved in your school or childcare program.

*Please note these recommendations are designed to assist schools in improving school ventilation and should be considered in light of [CDC recommendations](#), [CDPH recommendations](#), local circumstances, conditions and feasibility.*

- **Opening windows, using portable air cleaners, and improving building-wide filtration<sup>1</sup>** are ways you can increase ventilation, when feasible, in your school or childcare program.
- **Bring in as much outdoor air as possible.**
- **If safe to do so, open windows and doors.** Even just cracking open a window or door helps increase outdoor airflow, which helps reduce the potential concentration of virus particles in the air. If it gets too cold or hot, adjust the thermostat. Do not open windows or doors if doing so poses a safety or health risk (such as falling, exposure to extreme temperatures, or triggering asthma symptoms).
- **Use child-safe fans to increase the effectiveness of open windows.** Where feasible and appropriate, safely secure fans in a window to blow potentially contaminated air out and pull new air in through other open windows and doors. This can be particularly useful during times of increased risk such as an outbreak or 1-2 cases in a classroom.
- **Ensure Heating, Ventilation, and Air Conditioning (HVAC) settings are maximizing ventilation.**
- **Make sure your ventilation systems are serviced and meeting code requirements.**
- **Set HVAC systems to bring in as much outdoor air as your system will safely allow.** Reduce or eliminate HVAC air recirculation.
- **Increase the HVAC system's total airflow supply to occupied spaces** when you can. More air flow encourages air mixing and ensures any recirculated air passes through the filter more frequently.
- **Disable demand-controlled ventilation (DCV) controls** that reduce air supply based on occupancy or temperature. This way the air supply will remain constant throughout the day.

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<sup>1</sup> Refer to CDC recommendations regarding filtration system efficiency at <https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html>



- **For simple HVAC systems controlled by a thermostat**, setting the fan control switch, when feasible, from “Auto” to “On” will ensure the HVAC system provides continuous air filtration and distribution.
- **Filter and/or clean the air in your school or childcare program.**
- Mobilizing limited resources like high efficiency particulate air (HEPA) filters and exhaust fans to areas of higher risk (i.e., students with respiratory illness in a classroom). The goal is to increase air exchanges per hour, which is the rate at which outdoor air replaces indoor air within a room.  
***Please note to keep exits clear and prevent tripping hazards potentially created from cords/cables.***

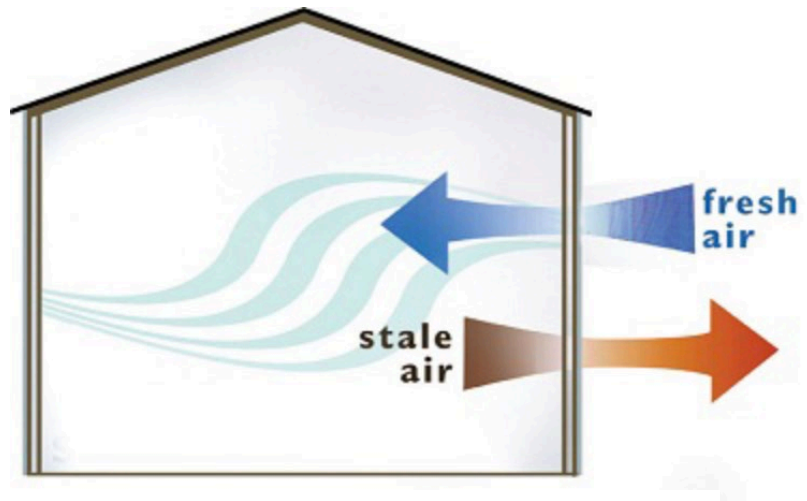
There are 2 ways to accomplish this:

1. *Bring fresh air into room*

- Configure HVAC system to maximize outdoor air and minimize indoor air recirculation
- Ensure that HVAC system fans operate continuously when indoor spaces are occupied
- Utilize HEPA filters to filter air in the classroom

2. *Exhaust old air out of room*

- Useful during times of higher risk
- Sufficient to purchase a few for the entire school
- Clean and maintain “return” vents to allow for unobstructed air flow of exhausted air
- Install exhaust fans into window frame or place at doorways directing airflow outside the classroom
- Window exhaust fans can be custom fitted to prevent air leaks and maintain ideal indoor temperature
- Additional information can be found at <https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/interactive-ventilation-tool.html>



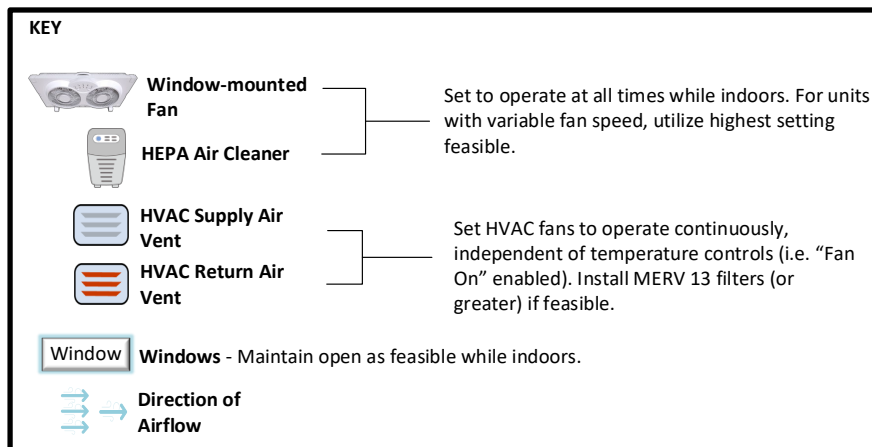
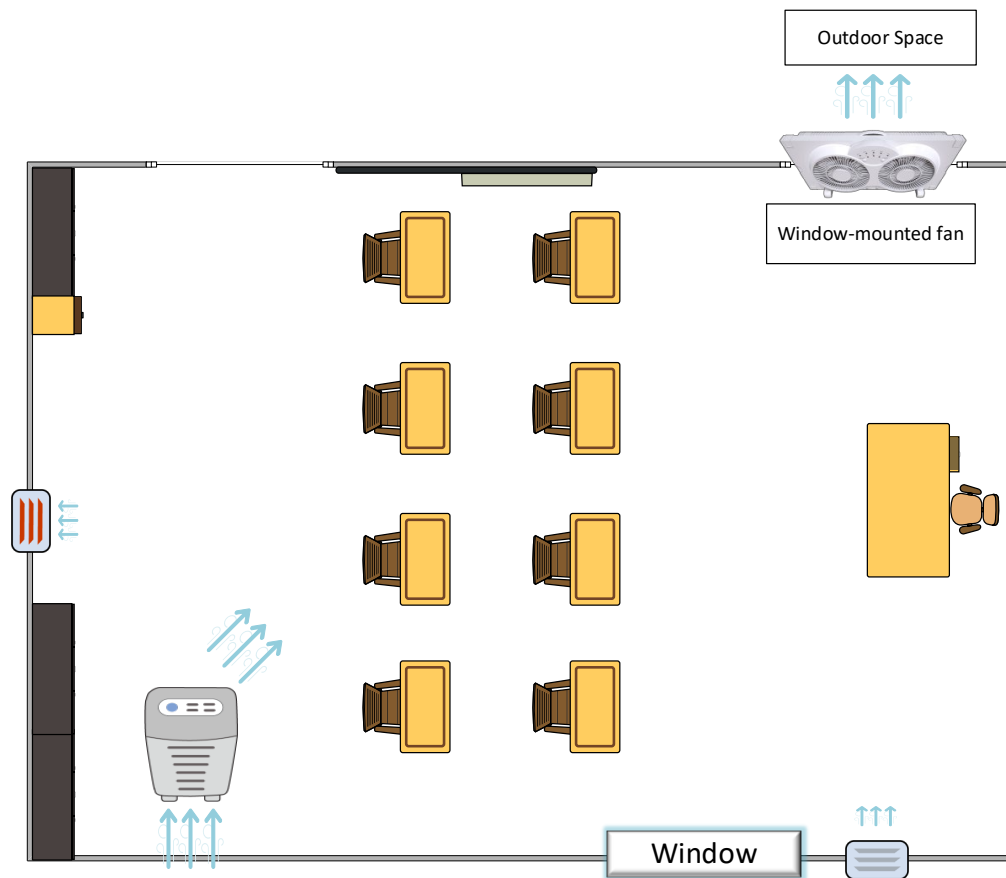
Source: <https://www.rapidrestorals.com/other-services/air-exchange-systems/>

## II. Suggestions for improving ventilation by classroom type

### 1. Classroom with Openable Windows and Central Air

Figure 1 below depicts use of a HEPA filter and window exhaust fan. The HEPA filter introduces filtered air into the classroom while the exhaust fan moves old air outside the classroom. The HEPA filter is positioned towards the center of the classroom opposite to the exhaust fan and away from other “supply” vents optimizing its usefulness in ventilation management.

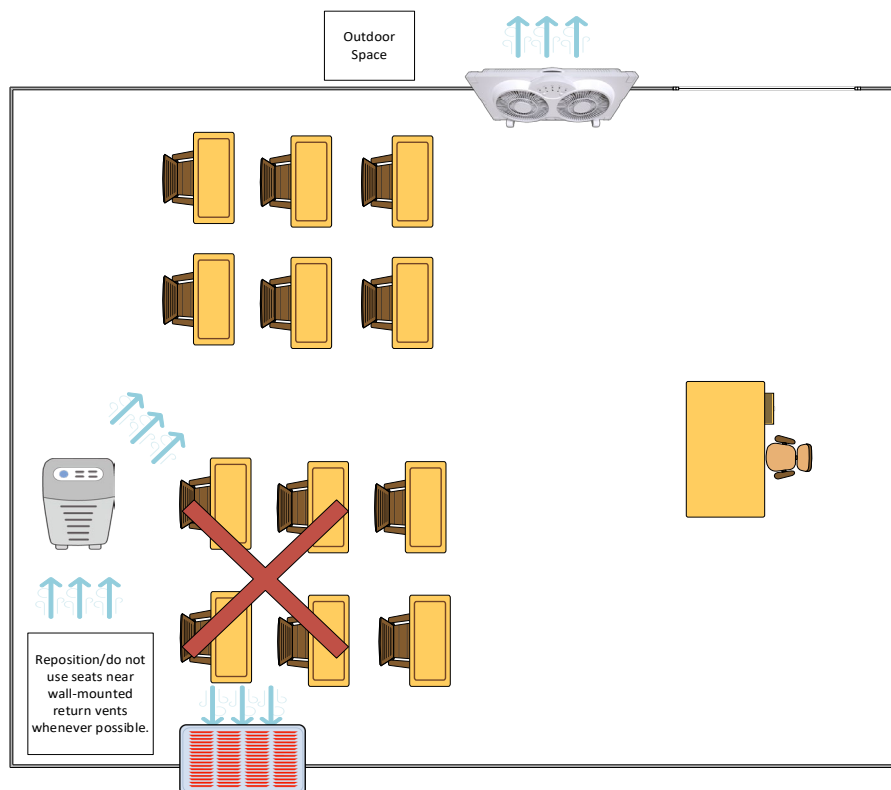
**Figure 1: Classroom with Openable Exterior Windows and Central Air**



## 2. Bungalow-style classroom

Figure 2 below depicts a classroom with a “Bungalow-Style” wall unit HVAC system with HEPA filter and exhaust fan. It is recommended that desks not be placed near these units if the intake vent is near desk height to prevent “funneling” of exhaust air towards students. Also, it is recommended replacing non-directional vents on these units with directional vents directed towards the center of the classroom to prevent a “closed-loop” phenomena.

**Figure 2:** Bungalow-style classroom with openable windows, mini-split A/C, exterior door leading to outdoor space



### KEY



**Window-mounted Fan** – Set to operate at highest fan speed feasible, and blow toward outdoor space.



**HEPA Air Cleaner** – Position in areas with air stagnation and/or in higher density areas within classrooms to the extent feasible.



**Wall-mounted Return Vent** – Reposition/vacate seats adjacent to wall-mounted return vents.



**Windows** - Maintain open as feasible while indoors. Set fans as close as possible to opened doors/windows.

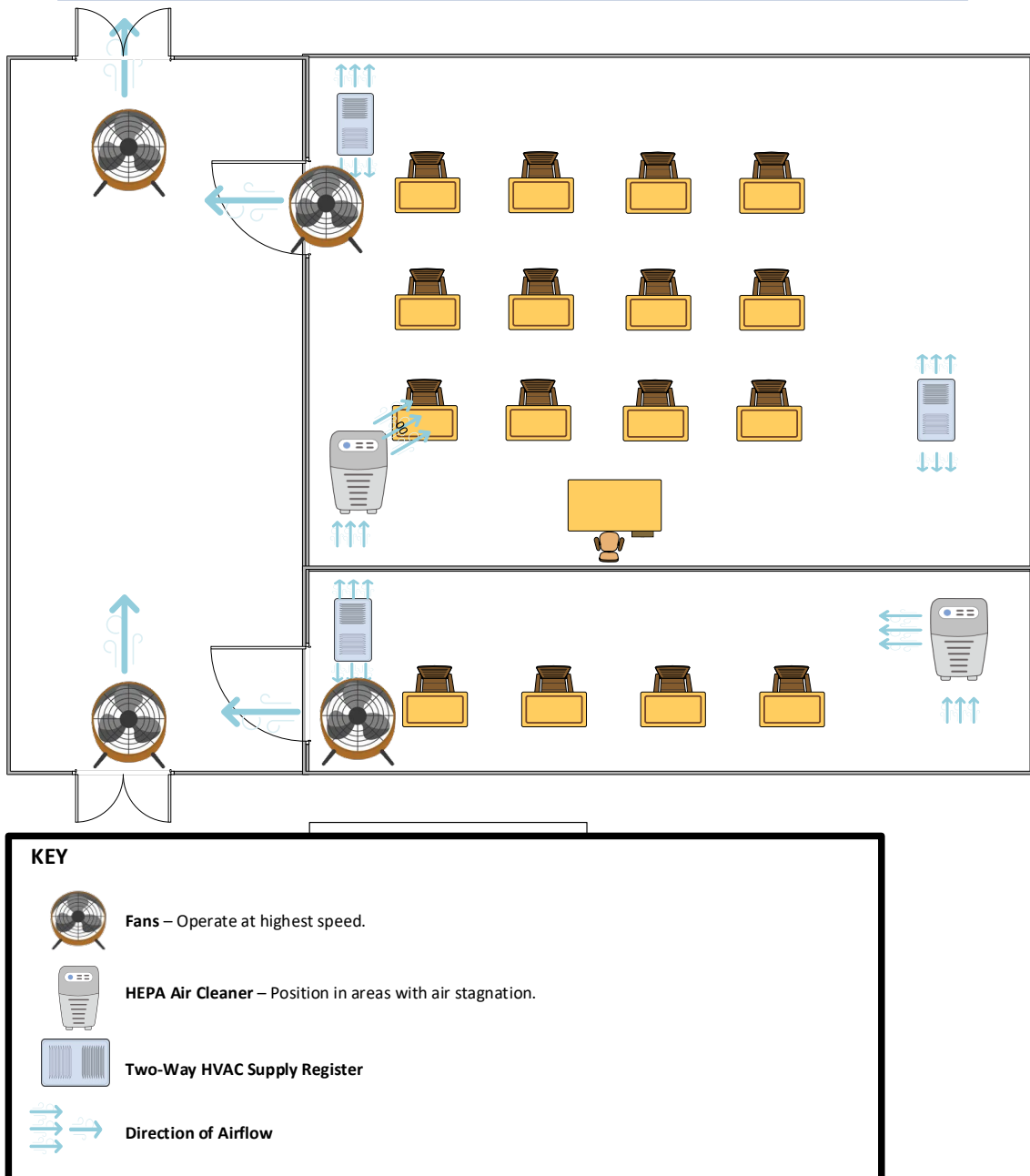


**Direction of Airflow**

### 3. Classroom without openable windows and central air

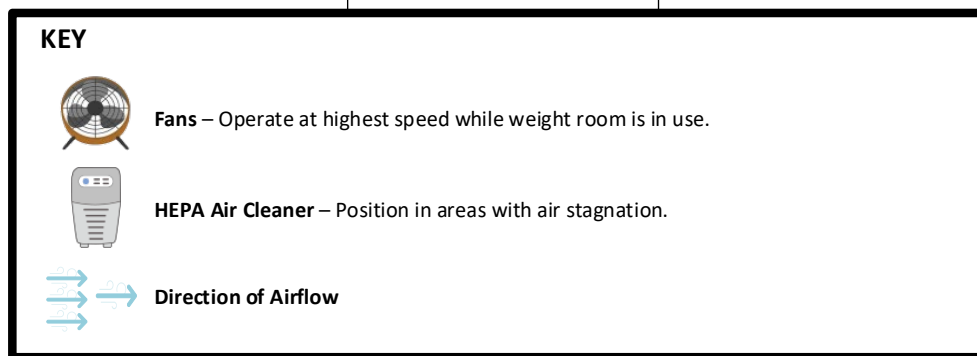
Figure 3 depicts a classroom leading into an indoor hallway. HEPA filter is placed away from other “supply” vents and exhaust fans and aimed towards the center of the room. Classroom exhaust fans direct air toward hallways if windows cannot be used to exhaust air. Hallways also have fans to direct air through this space.

**Figure 3:** Classroom without openable windows, central air available, connected to hallway with exterior double-doors.

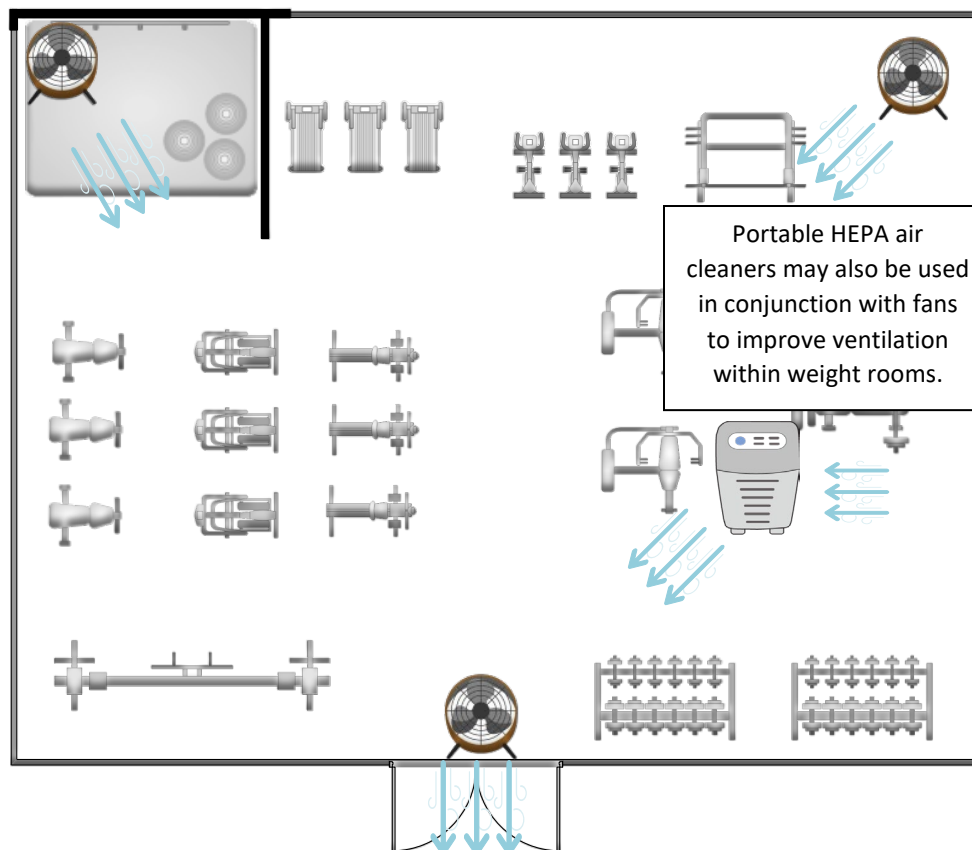


### III. Utilizing Fans in Common School Weight Room Configurations

Figure 4 depicts common weight room configurations and ways to utilize fans for improved ventilation. As weight room use increases risk for respiratory virus transmission due to heavy exertion and close contact, using a high-speed fan tilted 45 degrees upward is recommended. Use fans to move air across the room, placing HEPA filters in areas of poor ventilation. Move frequently used equipment like dumbbell racks away from walls and into areas with better airflow.

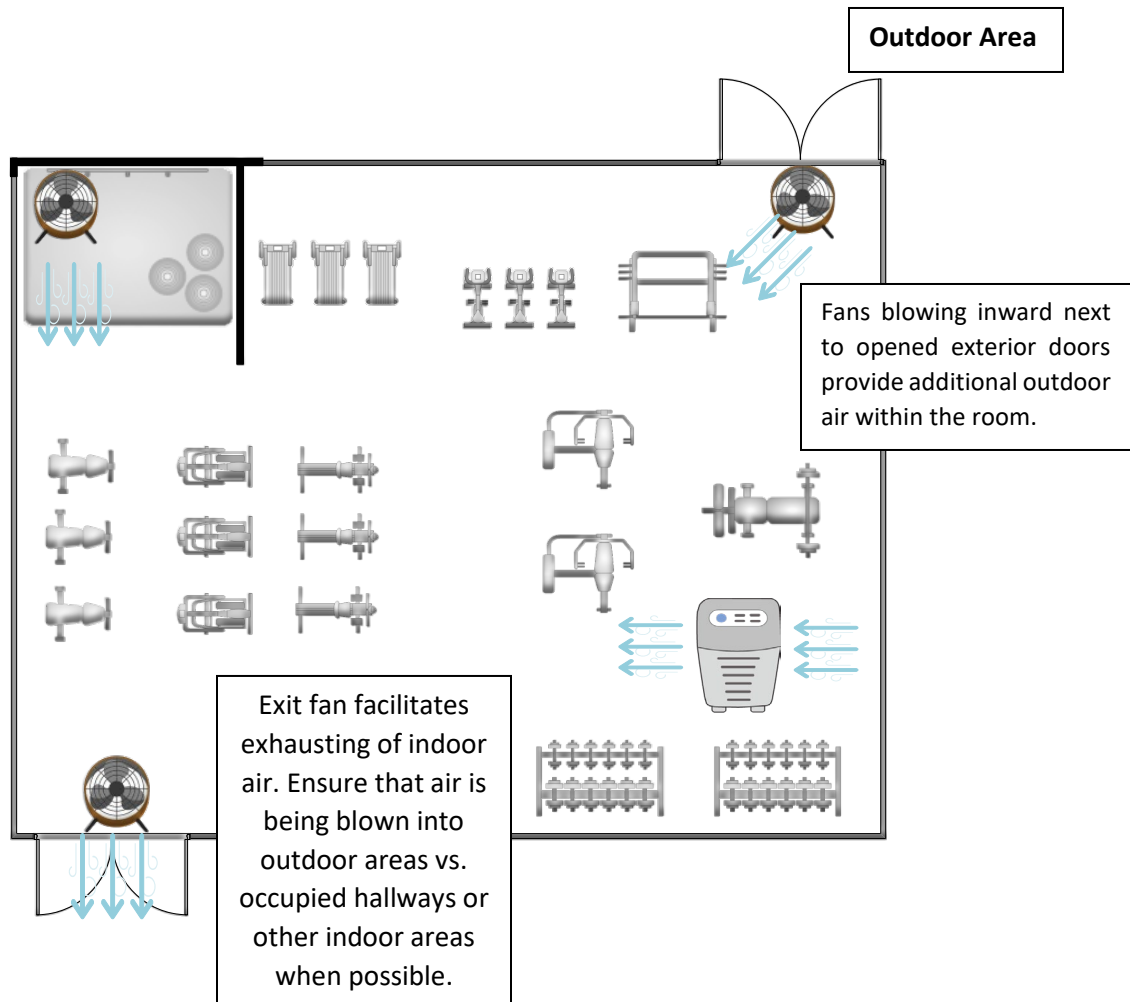


**Figure 4a: Weight Room with One Openable Exterior**





**Figure 4b: Weight Room with Two Openable Exterior**

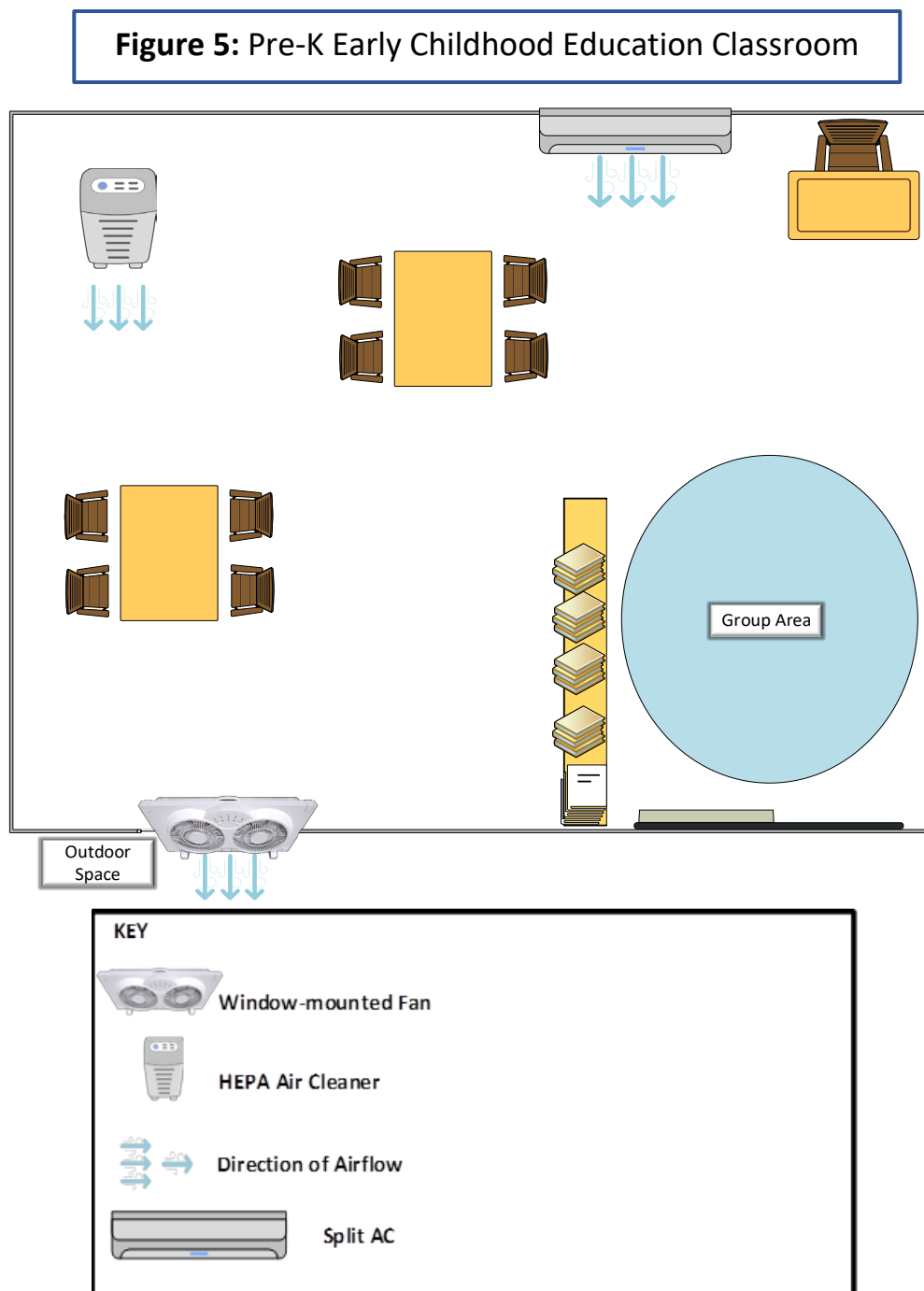


For gym ventilation recommendations, please visit:

<http://publichealth.lacounty.gov/acd/ncorona2019/docs/GymVentilationGuidance.pdf>

## IV. Suggestion for Improving Ventilation in Pre-K Early Childhood Education Classroom Settings

Figure 5 below depicts a classroom with an air conditioning wall unit without a centralized HVAC system. HEPA filter placement allows for movement of air in same direction as wall unit where airflow is poorest. Window exhaust fan on opposite side of room moves air outside classroom.



## V. Acknowledgements

The Los Angeles County Department of Public Health is extremely grateful to all our school and labor partners for all their thoughtful guidance, supportive partnership, and continued efforts to protect the health of our school communities across Los Angeles County. We would also like to acknowledge the following people and organizations for their partnership, advisement, and participation in the Los Angeles County Department of Public Health:

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