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A Breath of Fresh Air: Bill Hayward and the WAVE Bring Clean Air to Classrooms

by Michelle Netzloff-Luna

"You follow your heart and see how you can make a difference in the world." -Bill Hayward

The solution is easy, So easy, kids can make it. It's inexpensive. It's effective.

And for lessening covid risk, it's essential.

Bill Hayward, CEO of Hayward Score and Hayward Lumber, saw the simple genius in it and brought it to Darryl Smith, CEO of the WAVE Program.

Smith had the connections and brought it to the WAVE kids.

WAVE kids assembled the talent and built it for PG classrooms. Together they are making it happen for PG schools.

What exactly is this solution?
An abundance of generosity. And a Corsi-Rosenthal box fan.

The Invention

The Corsi–Rosenthal Box fan is a do-it-yourself air purifier that can help make classrooms safer. It can be built inexpensively, and was designed during the Covid-19 pandemic to reduce levels of airborne viral particles indoors.

"Dr. Richard Corsi, Dean of Engineering at UC Davis, is one of the leaders in environmental engineering" says Hayward. " He developed a way to replicate a $400 machine for $80."

Materials needed for the box fan are simple and few. It takes four to five 20" HEPA (high efficiency particulate air) filters, one 20" box fan, duct tape and some cardboard. That's it. It takes about 15 minutes to make, lasts for months, and costs less than $100.

There is a wonderful video created by Hayward's daughters Delphinia and Venezia to teach kids how to make the CoraiRosenthal box fan. It had 100,000 shares within hours or being posted and now 250,000. "Take a quick watch." suggests Hayward. "It's only 120 seconds. Delphinia narrated and edited it on her own from what she learned listening to me. All the high school kids and 6th grade science classes watched it." This video is on YouTube under *School girls teach how to build a DIY air filter for Clean Classroom Air.*

This simple invention effectively ventilates classrooms and creates a healthier environment by removing dust, pollen and smoke. But most importantly, the Corsi-Rosenthal box fan is "90% effective at removing airborne Covid virus particles" according to a recent CBS News publication. (1) This makes it an essential component to keeping schools open during the Covid pandemic.

Bill Hayward explains, "Box fans are a budget/social equity hack when the school budget isn't able to afford two $300-400 commercial HEPA filters per classroom. It is a way to start immediately. To reduce the risk of spreading all airborne infectious diseases, the national best practice is to ventilate indoor environments with six air changes per hour or 6 eACH. Six effective air changes means we need to completely change the air in the classroom six times every hour. This is done by increasing the amount of outdoor air in the HVAC (heating, ventilation and air conditioning) system as well as cleaning the air within the classroom using the CorsiRosenthal box fan or a couple of HEPA filters.Then monitoring these air changes allows you to see that the systems are doing their job. Monitoring is an essential part of the formula.

So the basic essentials for purifying air are fans, filters and monitors," reminds Hayward. "People realize we can do it.We started introducing the ventilation best practices to the county supervisors in December of 2020. I also presented these ideas to Santa Catalina who was able to remain open for much of COVID and to Stevenson. The Monterey Peninsula school district also got it, They said "Bill this is evidenced based, it's right, it makes sense. We are going to start implementing it." So they implemented it in 84 classrooms. The end goal of Monterey county schools is to have this in all their 2600 classrooms.

"The next step, " recalls Hayward. "was to organize a Corsi-Rosenthal box fan build in Pacific Grove. Universities through out the country have already been organizing these builds."

That's when Hayward contacted the WAVE Program CEO Darryl Smith in October 2021 for some help.

The Build

"Bill was beginning his Clean Classroom Air project last summer, and was very passionate about it." recounts Smith. "He was interested in helping PG schools and he wanted me to get in contact with the school district. But there ended up being time constraints going through the district, so in the interest of helping our schools right away, Bill and I decided to move ahead on our own. I got in contact with two WAVE kids, Cristopher Rosas and Kieler Troy, both seniors at PGHS. They organized a box fan build on Saturday Nov 20, 2021 with Bill at his lumber yard, and put together about 60 fans on that day with WAVE kid volunteers."

"Hayward Lumber donated materials for the first 160 box fans and provided the location to build, as well as the truck to transport," relates Hayward. "Our manager in Pacific Grove, Willie Nelson, loved the idea of helping the schools and made it happen on our end. Darryl made it happen on his."

"From that build,30 fans went to the high school, Robert Down took 10 and Forest Grove took 10." adds Smith.

Greg Enterline, 7th grade science teacher at PGMS and water polo coach for the WAVE, also got involved.

"Greg organized a build at the Middle School with Cristopher Rosas and Kieler Troy to show his kids how to make the box fans," says Smith.

"This was perfect for my kids," asserts Enterline. "This was all about thinking through the process, making things with your hands and giving back to the community.

Bill, Darryl, Kieler and Cris came to PG Middle and gave a demonstration. They made a box fan for my 6th grade STEM and my 7th / 8th grade STEAM class," Enterline continues.
"We built one together as a class, and they went on to build one of their own with partners. I had the kids make blueprints, then we compared what they thought to how they actually built it. Lots of critical thinking! The kids were very excited to actually build something and donate to every classroom. The goal is to build for all of our school, the two elementary schools, and eventually get to the high school and adult school."

The Talent

The talent behind the Corsi-Rosenthal box fan demonstrations at the PG schools was Cris Rosas and Kieler Troy.

Graduating senior Cris Rosas spearheaded the box fan project and led the school demonstrations. He was well suited for the job. As lead instructor for the WAVE's Math Wave Mates program this past summer and founder of Math Mates Initiative, he had a lot of experience talking to kids.

Cris explains, "Math Mates is a student run tutoring enrichment service that I founded during the 2020-21 school year to help the district deal with the educational needs of Covid. Since then, we have extended our scope to include STEM outreach like the box fan project that we are doing now, I'm also president of the Math and Science club here at PGHS, so Mr. Smith asked me to spearhead the November project and assemble the student representation at Hayward Lumber for a giant build. So with my Math Mates team and volunteers from the Math Club and the Science Club we manned about 20-25 person build at Hayward Lumber in November 2021."

Kieler Troy, a senior at PGHS and part of the Robotics Team, also participated in the box fan build at Hayward Lumber.

"Darryl came to the HS Robotics Team and said there was this great opportunity to go down to Hayward Lumber and build a bunch of these box fans as part of a community service project. A couple of my teammates and I went down, and got involved as volunteers. Over the course of that activity, I somehow became the quality inspection manager!" muses Kieler.

Donna O'Donnell and Breaker girls help with the build at Hayward Lumber as Bill Hayward explains the build to another student.

"After we had finished the assembly at Hayward Lumber and donated the box fans," continues Cris, "Robert Down Elementary reached out to us about doing a presentation for a class. So we presented to Ms. Levy's 4th grade about the science of the box fans, why it's important to have air filters in our classrooms, and what it meant in terms of the covid pandemic. With that presentation a big thing Kieler and I were trying to do was get the kids excited about STEM. I think engineering and the sciences really draw their value from how we can help others. That was something we really wanted to emphasize. I've been able to tutor a lot of the students in the class through Math Mates, so that personal connection really helped establish that STEM is something accessible, engaging, fun, and cool!"

"I think we did a really good job engaging the kids." relates Kieler. "Building the fans was very similar to what I do as team mechanical lead in Robotics. The team is part of a program where we build a robot in 8 weeks. I run and organize the building of the robot, manufacturing all the parts, the assembly etc. Building the box fan was very similar. It was nice for me to get leadership experience in organizing people, bringing them together, keeping them engaged, and making sure they know what to do."

"When we made these fans for the schools, we all signed the bottoms with hand turkeys because it was just Thanksgiving when we did the build at Hayward," shares Cris. "We were happy to give back and be involved in such an awesome project. Hayward Lumber has been super generous to the district and has donated even more, so I think from here on out the building will be done by those classes at PG Middle."

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"The goal," suggests Hayward, "is to also have proper ventilation in all the classrooms at PG high, PG middle and PG lower."

"We were happy to help Bill because he helps us so much." adds Smith. "He has been a major benefactor of the WAVE program since 2017. Bill is prepared, he knows what he's talking about. Every community has people like this, but many people don't know all the good these people do."

The Legacy

The Corsi-Rosenthal box fan solution has even more benefits besides keeping our classrooms safer from infectious disease.

"The legacy benefit of clean air classrooms will be improved learning outcomes, fewer sick days and greater average daily attendance income. We will also have great indoor air quality on days with high pollen or forest fire smoke which we need." affirms Hayward
Scientific studies conducted at Harvard verify cognitive learning increases when the air is cleaner. In September 2021 Harvard released results of a 4 year research project on the impact of improved air quality on cognitive function entitled Harvard Cognitive Fx Study. When air quality was improved to a level referred to as great indoor air (CO2 below 600ppm, low VOC and PM 2.5), cognition increased 60-260%, depending on the cognitive domain. (2)

In another study, Harvard Schools for Health published research of "100 U.S. elementary classrooms, in which positive associations were observed between ventilation rates and increased performance on standardized tests in math and reading," (3)

"Learning doesn't happen very well in classrooms with a lot of CO2." Hayward advises. "Harvard has demonstrated in multiple studies for years that learning goes up significantly when air quality is good, there are fewer sick days and kids are more relaxed and teachers feel better. The legacy benefit of cleaner air is higher average daily attendance in school and better test scores for kids. That's a huge benefit. Now we need it and will need it to reduce rates of infection.

"I've been working on the indoor environment for years with the top schools in environmental engineering and the leading professors like Dr. Richard Corsi, Dean of Engineering at UC Davis and Dr. Hernandez who is a professor of Environmental Engineering at the University of Colorado, Boulder. We started Hayward Score in 2015 to make if affordable for all Americans to diagnose their home and find affordable solutions they could trust.

With Covid, the importance of clean indoor air increased significantly. So I started the Clean Classroom Air movement and the CleanClassroomAir.com website as a way to educate schools about how to ventilate classrooms right, meaning 6 effective air changes per hour - using ventilation, filtration, proper mixing and monitors to validate that the risk management tools are working 24/7.

I did this purely as my nonprofit effort to help our school system. That was my sole motivation when I started this a year ago. To make these improvements happen and spread the knowledge. I'm trying to help keep our schools open. That keeps our kids and our parents sane, and we know how to do it.

Now a year later, I've formed a partnership with Andrew Limcaco and launched a company called Air By Design that focuses on providing engineered air quality solutions for schools, restaurants, retail and offices. The goal is to make it as safe to be indoors as outdoors.
It wasn't on my mind a year ago when I started this, it wasn't what I set to do. But I think that's how it happens. You follow your heart and see how you can make a difference in the world."

Generosity is making that difference in helping keep PG schools safer. Generosity of time. Generosity of funding and resources. Generosity of knowledge. Generosity of talent.

Oh. And a simple Corsi-Rosenthal box fan.

RESOURCES
https://www.cbsnews.com/news/covid-air-purifiers-particles/
https://www.youtube.com/watch?v=oTypQtx1tvE
Harvard.Schools_For_Health.Foundations_for_Student_Success.pdf

For more information, please visit
HaywardScore.com
CleanClassroomAir.com
CleanRestaurantAir.com
AirByDesign.com
Box Fan in 120 seconds-Delphinia and Venezia Hayward https://youtu.be/ciPnaeA1_TM
www.thewaveprogram.org