



Why PTA Groups Should Install Purifan Clean Air Systems in Classrooms

White Paper

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Abstract

In the past 30 years, independent research studies have focused a lot of attention on the negative effects of airborne dust, allergens and contaminants. These studies have shown a direct relationship between the higher levels of classroom airborne particulates and higher rates of absenteeism, increase incidence of asthma, higher student and teacher health costs and lower test scores. PTA or Parent Fundraising Groups are the number one source of funding for school improvement technologies and equipment. Now these fundraising groups are focusing on the many benefits of filtering classroom air to reduce allergens and the spread of seasonal contagious illnesses. By implementing effective classroom air filtration systems, schools are realizing the benefits of cleaner classroom air, including: 1) Reduced absenteeism; 2) Increased school funding; 3) Higher average test scores; 4) Lower school operating costs; 5) Healthier environment; and 6) Improved ability to retain teachers. Cleaner classroom air quality also has a direct payback to the parents, their employers and health insurance providers, because keeping children healthier and in school, also keeps their parents at work and lowers health care usage costs resulting in lower cost health insurance. Cleaner classroom air is a powerful Wellness Program with a significant and immediate payback.

This white paper discusses how Six Sigma Methodology can be applied to the PTA decision process of where to invest in their school to offer them the biggest potential improvement and financial payback while creating a much healthier school environment for the children and teachers.

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Improving Indoor Air Quality Offers Schools, Parents, Parent's Employers and Parent's Insurance Companies Significant Benefits and Financial Returns

An Analysis of the Benefits of Improving Classroom Air Quality Using Six Sigma Business Improvement Methodologies

Background

Six Sigma is a business improvement methodology that focuses on delivering high performance, reliability and value to the end customer. Originally developed by Motorola in 1986, Six Sigma has gained popularity as an important element of Total Quality Management (TQM) initiatives practiced by leading corporations, including Honeywell International, Raytheon, General Electric, Pizza Hut and others. Six Sigma is a highly structured program for improving business processes and represents the latest state-of-the-art practice in Total Quality Management initiatives. The fundamental objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement in areas the company can actually control.

The Six Sigma program utilizes the methods and analytic tools of engineers to answer critical business questions such as: "What factors influence our ability to achieve key goals?" and "Which of these factors can we actually control?" and "Of the things we can control, where will changes produce the most improvement in reaching our goals?" As such, Six Sigma methodology can help guide PTA or parent fundraising groups to focus their attention on an element they can easily improve, and realize this simple change will produce one of the most significant improvements in achieving their goals of a better school.

Premise of Study

The purpose of this white paper is to demonstrate how schools can apply Six Sigma business improvement methodology to analyze the benefits of cleaner classroom air. Using Six Sigma principals as a guide, we seek to answer the following question: "*How Can Cleaner Classroom Air Improve the Key Performance Outcomes of the Average Elementary School?*" Our first step is to identify some of the important school performance goals that may be influenced by improving indoor air quality. Although there would be some variation in priority and terminology, we assume for the purpose of this paper that every school would include most of the following in a list of their key goals and objectives:

1. Reduce absenteeism as much as possible; children perform better if they miss less school.
2. Increase our school's funding through any available sources.
3. Improve average test scores for our students.
4. Reduce operating expenses wherever possible so we have more money to spend on key programs.
5. Provide a healthy, safe environment for the children and our teaching staff.
6. Recruit and retain the best teachers.

A comprehensive Six Sigma analysis of how to run an entire school would require several semesters of work. For the purpose of this paper, we will instead utilize the following key Six Sigma principles for our analysis:

- Which known factors influence our ability to reach key goals?
- Which of these factors do we really have the ability to change or improve?
- How can we estimate the potential impact of these changes?
- How can we measure the value of these changes?
- How can we determine a Return On Investment (ROI) analysis for any costs related to implementing these changes?

Goal 1 – Provide A Healthy Classroom Environment that Reduces Student Absenteeism

Following the Six Sigma principals listed above, we begin our analysis by considering the relationship between indoor air quality and the goals and objectives also identified above. Beginning with the first goal of reducing absenteeism, a Six Sigma analysis would first consider all of the reasons students and teachers might be absent. Following is a list of common causes for absenteeism that you might experience in your school:

- ☐ Allergies, Asthma or a Respiratory Related Illness or Illness Spread by Airborne Transmission
- ☐ Other Types of Illness – Stomach Flu, Fever, many also contagious in a classroom setting
- ☐ Accident or Injury Related Absence – typically these accidents do not occur at school
- ☐ Sports or School Related Trip
- ☐ Extended Trip with Parents
- ☐ Truancy or Unexcused Absence (Rare in the elementary grade levels)

Some of the items on this list are difficult to change. You can implement programs to increase parent involvement and safety awareness, but—for the most part—four of the causes of absenteeism on this list are beyond a school's control. However, research indicates that the leading cause of school absences—respiratory related illness and illness spread by airborne transmission—results in more than 80% of all school absences in elementary schools. Many studies completed during the past 25 years also indicate that respiratory illnesses are exacerbated (and sometimes caused) by high levels of airborne allergen particulates found in typical indoor air found in most school classrooms. These particles are not a building problem, they are caused by so many people sharing the same small space and volume of air in the room. Most of these particles arrive with the students or are created by the students in the classroom. Moving the children to a new school classroom doesn't eliminate these particles, they follow the people.

Annual levels of absenteeism in elementary schools typically range from a low of 3% to a high of 15%. With approximately 185 school days in a school year, 10% absenteeism would equal 18.5 sick days per year, per student/teacher. Conservatively, we can assume that 80%, or 14.8, of these days are caused by respiratory illnesses or common contagious classroom illnesses like colds or flu. Considering the relationship between poor indoor air quality and respiratory illnesses, we then ask:

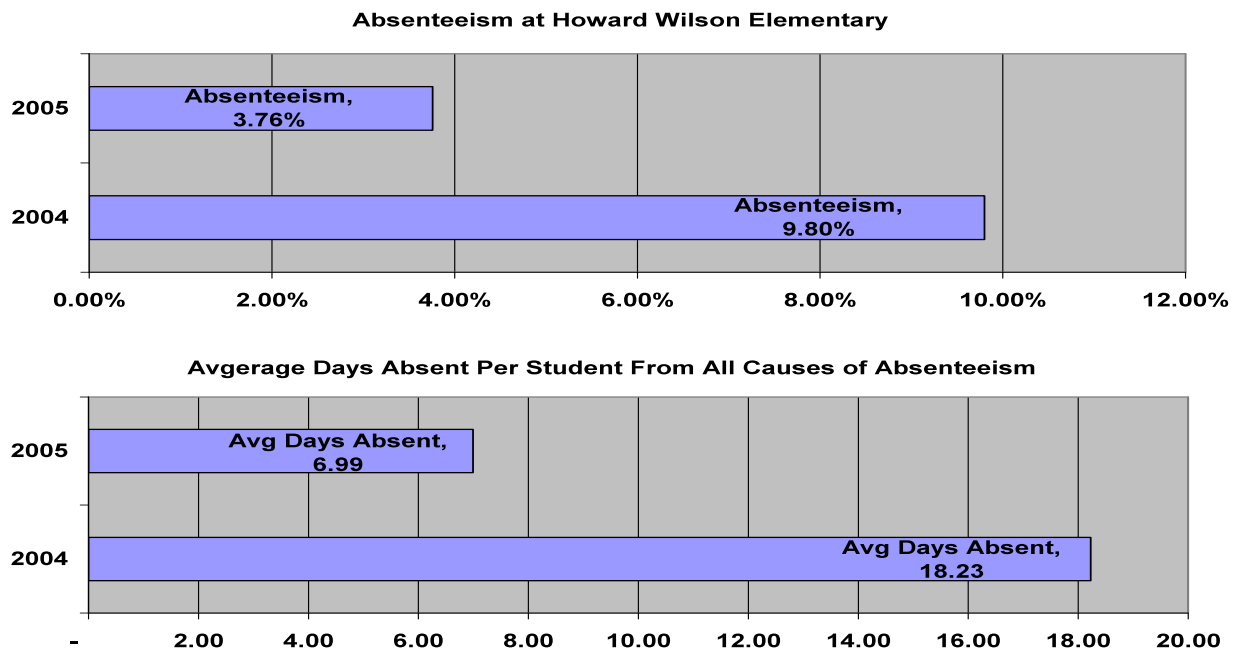
"What if a new low-cost, affordable air-quality solution was installed in school classrooms that could lower airborne allergen particulate levels in classrooms and thereby lower the number of sick days for children and staff caused by poor indoor air quality?" and:

"How would improving this single process impact the key goals of operating a successful school?"

Many serious health problems are not preventable, but studies show that many respiratory related health problems appear to be substantially preventable. One of the most available and easy-to-implement improvements appears to be filtering the indoor air to remove harmful particulates. Numerous Scientific studies also prove that if the level of filtration is less than 6 to 10 air changes per hour, there will be very little—if any—measured improvement in health and absenteeism. This makes good scientific sense, since more rapid filtering will capture and eliminate the millions of new particles that are constantly being introduced to the classroom from many sources, including the occupants themselves. This keeps the levels of particles that are inhaled by the occupants to much lower levels, which appears to reduce the symptoms caused by these particles. Applying Six Sigma principals, we need to analyze what the impact of reduced illness and absenteeism might be on the school's key goals.

In 1992, scientists in Sweden conducted a 3-year double blind study to assess the effects of air filtration in the classroom. In year two of the study, classroom air was filtered 10 times per hour. The result was a 55% reduction in student absenteeism. Conversely, in years one and three—when neither facility had filtered classroom air, absenteeism was *more than twice as high*.

More recently in the U.S., schools that installed low-cost Purifans which filter indoor classroom air at a rate of about 40 times per hour, the improved air quality and lowered level of airborne particulates produced a substantial reduction in student absenteeism. For example, in 2004, Howard Wilson Elementary School in Leavenworth, Kansas installed a Purifan filtration system. The filtered classroom air produced the measured improvement of *reducing the average number of sick days in 2005 by 61%, or 11 days per student*. Since absenteeism is caused by other reasons as well, this improvement in total absenteeism was generated by an even larger percentage reduction in illness-related absenteeism! This proves that cleaner indoor air quality can have a substantial impact on key health issues for both children and teachers.



Further analysis using Six Sigma principals would also generate the following conclusions:

- Children who miss fewer sick days will receive more instruction from the teacher and in-class quizzing, which will help them score better on tests. (Studies have shown that students in schools with the best air quality perform 17% better than students in schools with the worst air quality.)
- Children and teachers in classrooms with cleaner air will feel better, cough less, and will have fewer distractions caused by common allergy and asthma symptoms triggered by high levels of airborne allergens. (This has been proven in numerous research studies reported by the EPA.)
- All the students and teachers in a classroom with cleaner air quality will have a reduced need for prescription and over-the-counter drugs to control allergy and asthma symptoms. (Studies have shown that prescription and over-the-counter allergy medicines commonly cause drowsiness, reduced concentration levels and increases in mental mistakes, errors and accidents. They can even lower hand-eye coordination and can impact personality, creating behavior problems.)
- Less coughing, sneezing and going to the tissue box will reduce the level of classroom distractions during teaching and test sessions. Simple classroom distractions can have a dramatic impact on test results for every child in the class, including the healthy ones.
- Repeated respiratory illnesses are the number one cause of teacher sick days and create the need for substitute teachers. It is well-recognized that the substitute teacher is not going to be as effective as the regular teacher in terms of moving the class along in the critical subject matter appearing on key performance tests. Thus, reducing the need for substitute teachers can help raise average test scores.

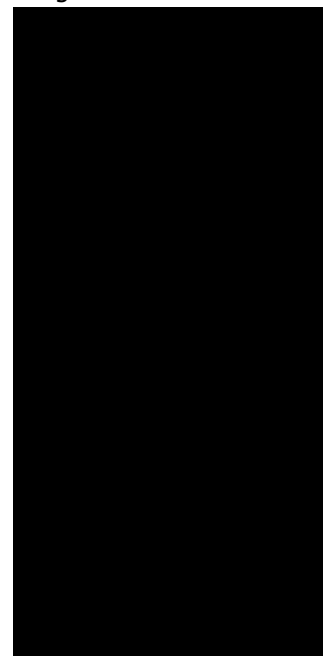
- Many teachers report that they lose their voice because of airborne irritants, allergy and asthma issues. When this occurs, they assign reading or computer work to their class since their primary teaching tool is their voice. One can then conclude that dirty classroom air reduces their ability to talk and therefore, reduces their effectiveness as a teacher and student learning suffers.

How Purifan Works

The Purifan that produced the results cited above uses a filtration system mounted to a ceiling fan motor that pushes air through five-stage filters at high volumes. This air-flow pattern forces filtered clean air back to every corner of the room. Because the Purifan cleans and circulates more than 2,000 cubic feet of air every minute, the entire room is cleaned—not just in pockets.

According to the EPA and the American Lung Association, the number of “Air Changes per Hour” (ACH) is critical when choosing an air cleaner. The Purifan effectively filters the air in a 20’ x 20’ x 8’ room more than 40 times per hour. This is 4 times the Air Changes per Hour achieved in the Swedish study cited above, which resulted in a 55% reduction in absenteeism.

The increased air movement produced by the Purifan also helps to equalize the temperature in the room, thereby improving the comfort of its occupants. The air motion can save energy since wind-chill cooling over the skin helps reduce air-conditioner load in the summer. In the winter, moving hot air down from the ceiling can save on heating costs. These savings are estimated to be up to 10 to 12% of utility costs to heat and cool the classrooms.



Goal 2 – Increase School Funding

Currently in 11 States, school funding is based on Average Daily Attendance (ADA). In the example school given above, just cutting out 61% of the absenteeism adds 23 more students to the reported ADA numbers, which is worth at least \$115,000 per year in additional funding (using a conservative average of \$5,000 per student). This amount may be closer to \$150,000 per year in ADA states that pay more per student. ADA funding varies from state to state and school to school based on many parameters, but averages between \$5,200 and \$9,600 per student per year.

The No Child Left Behind Funding Program has increased test performance requirements, which also increases a school’s risk of falling below key test score targets. Reducing absenteeism can have a significant effect on raising test scores, thereby adding comfortable safety margins to key NCLB targets—including attendance and test scores. Schools with low test scores and high absenteeism can be declared non-performing schools which can allow families to move their children out of these schools.

Goal 3 – Improve average test scores

Every teacher and school administrator knows that missing more days of class work due to repeat respiratory illnesses is going to dramatically impact the student’s test scores and ability to learn all the subject matter that is crammed into today’s aggressive curriculum. Most students cannot miss 2 days, come back and



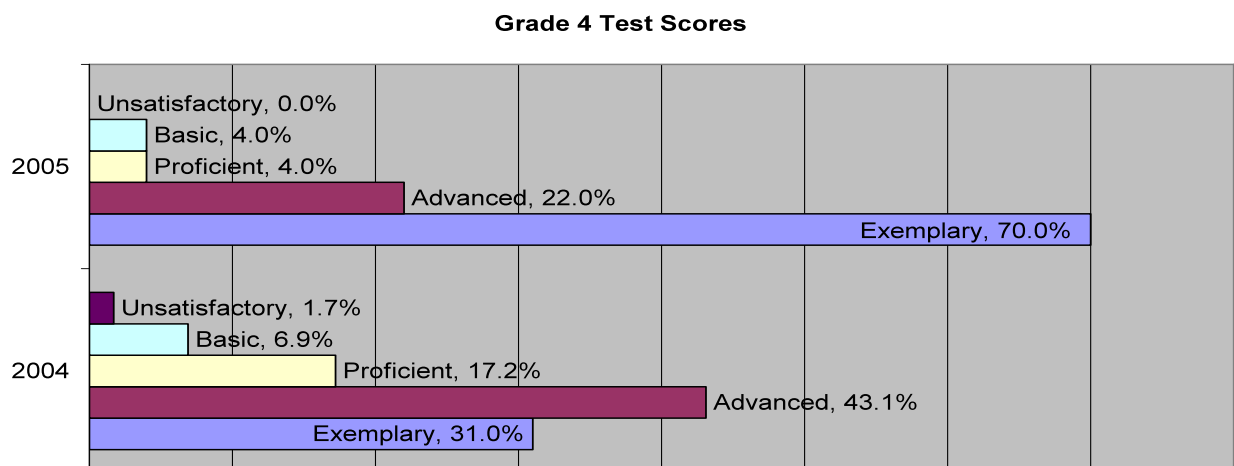
keep up with new work or ever fully make up the missed lectures and class work. A high percentage of the missed days are caused by common respiratory illnesses like allergies, asthma, sinus infections, ear infections, colds, influenza, congestion and common upper and lower respiratory infections. As we said before, these health issues are the number one cause of student and teacher absences. They also are typically the largest cause of medical costs for students and teachers, and some insurance studies show respiratory related illnesses cause more than 50% of the annual health care costs for elementary children and teachers.

Clearly, many factors influence average test scores, from teacher quality and curriculum to student IQ, student income level, quality of home life, quality of the school facility and so on. Every school is working on the items it can improve, and most recognize there are some elements they have little ability to change.

Applying the key premise of Six Sigma (that by focusing management's effort on something that can be easily improved) improving classroom air quality in order to reduce absenteeism should create the predicted outcome of improved learning performance and test scores. Repeated respiratory illness forces some allergy-sensitive students who are excited, willing and eager to learn to miss a lot of school. However, if you reduce high levels of allergens in classrooms, then these eager students can learn more and test better and you will achieve this improvement in the easiest way possible. Other potential solutions to increasing test scores are much more difficult and expensive to implement—and have not been proven to provide anywhere near the positive impact of reducing absenteeism and allergy-symptoms!

Since cause-analysis studies show that illness and absenteeism have such a huge negative impact on our key goal of improved test scores, then if we can reduce absenteeism and reduce the negative health symptoms associated with these dominant types of illnesses, we have the potential of making a dramatic improvement in student and teacher learning performance and this should significantly raise test scores.

Following are some actual test results reported by the school that reduced absenteeism by 61% after installing air filtration systems. Even more important than the impact on sick days, teachers reported that the students felt better and performed better in the classroom. Many students, teachers and parents reported that the change in air quality reduced the use of medicines—especially inhalers. The following state-reported test results show a major improvement in this school compared to the 9 other schools in the district. This improvement was achieved in one school year during which Purifans were installed (2 months into the school year). Since any student's test knowledge is built on what the student has learned in the past, the longer-term impact of cleaner air and reduced absenteeism on test scores in this school will build year after year, and a child who attends a Clean Air School from Pre-K on will have much better test scores in later years due to their stronger foundation of learning in prior years.



Goal 4 – Reduce Operating Expenses

In a comprehensive Six Sigma analysis we would analyze a long list of cost factors. However, following payroll, two of the other top five operating expenses in any school are utilities (primarily heating and cooling) and the cost of health care for teachers and staff.

The Purifan Clean Air System mounts just like a ceiling fan and moves air in the room like a ceiling fan. Following are some of the ways this airflow and cleaned up classroom air actually helps a school achieve key cost reductions.

- The increased air movement helps to equalize the temperature in the room and has been reported to help adjust the thermostat up to 4 degrees higher to help keep the occupants from feeling cold in the winter or hot in summer. Each degree of favorable adjustment can be worth up to a 3% savings in annual utility costs. A four degree adjustment can save 10-12% of classroom heating and cooling costs. In winter months, the air near the ceiling can be 8 to 12 degrees hotter than air along the floor or windows. A Purifan forces this air back to every corner of the room, allowing the school to turn down the thermostat by as much as 4 degrees on the coldest days, because there are no cold spots along the windows or floors with airflow of 40 air changes per hour in the room.
- HVAC filters stay cleaner and last longer. The HVAC industry reports that dirty filters cause HVAC systems to run much longer to heat and cool a facility, adding as much as 4% to annual utility costs. By capturing these particles expensive HVAC filters last longer.
- Studies completed by Blue Cross and Blue Shield indicate that health care costs for most healthy teachers are dominated by two types of expenses: more than 50% of their annual \$8,500 health care costs are related to respiratory illnesses, which are probably triggered or aggravated by high levels of allergen particulates in classroom air. The second highest cost is typically kidney or urinary tract problems because they can't drink enough water and go to the bathroom as easily as they should.
- Sick teachers also generate substitute teacher costs since you pay the primary teachers to stay home, and pay substitute teachers to monitor the classroom until the real teacher can return healthy enough to teach—including talking all day with a voice that is probably still strained by respiratory issues such as coughing or laryngitis.

Six Sigma analysis shows that cleaner indoor air quality and air movement in the classroom can have a significant impact on lowering key expenses such as utilities, teacher health care and substitute teachers. These potential savings increase the available budget needed to fund important education initiatives such as increasing salaries, adding teachers, adding counselors, funding new curriculum or new technology.

Goal 5 – Provide a Safe and Healthy Environment for Teachers and Students

A key safety concern affecting many schools are the extreme and rare violent shooting acts that make headline news periodically. Another key measure of a Safe and Healthy School Environment for students and teachers requires us to analyze the historical actual causes of health related medical costs for students and teachers. Since insurance companies who provide health insurance for teachers and elementary school students know exactly which health issues they spend their healthcare dollars on, we can study this information to find out where we should focus our management effort and dollars to generate the most potential improvement.

One recent Blue Cross and Blue Shield Study reports that on average, each teacher incurs approximately \$8,500 in insurance-covered health costs per year. As much as 60% of these costs were related to respiratory illnesses such as allergies, asthma, bronchitis, colds, influenza and upper and lower respiratory infections. When applied to the nationwide population of students and teachers, this represents billions of dollars. More importantly, for one teacher, preventable respiratory illnesses represent between \$4,000 and

\$5,000 per year of their total medical healthcare costs! The real short and long-term impact of poor respiratory health is even more expensive because studies show that high levels of airborne particulates in indoor air will create permanent health deficiencies and problems in students and teachers. These medical problems, triggered by high levels of particulates, are now known to contribute to the initial onset of Asthma, hardening of the arteries, coronary heart disease, reduced lung capacity, increased susceptibility to common respiratory illnesses and increased use of over-the-counter and prescription medications.

Given the severity and magnitude of the problems attributed to the health issues triggered by high levels of airborne particulates, Six Sigma principals would indicate that more management focus and financial investment should be focused on reducing one of the known primary causes of these problems: high levels of airborne particulates found in any school classroom with a high number of people per square foot. This air quality problem is not a building problem in most cases; it is caused by too many people sharing the same volume of air. The particulates are generated by standard processes in the environment such as pollen, mold, dust, shedding skin cells, fibers, paper particles and other elements that exist naturally in any indoor environment. The high level of particulates is caused by the number of people who generate these particles sharing the same room air.

There is also the undeniable fact that what a sick person exhales in a classroom, a healthy person near-by will soon inhale. This spread of common viral and bacterial illnesses and infections is a significant percentage of the health costs for an otherwise healthy teacher or student.

Since you can't eliminate the people or other sources of particulates, the only solution is to quickly filter out these airborne particulates to create more healthy air to breathe. High levels of filtration can reduce the amount of particulates ingested when breathing by more than 90%. This reduction in particulate levels creates a substantial reduction in the symptoms and problems that are created by these particulates and allergens. There is also a known process of healing that allows the respiratory system to get stronger and healthier while breathing cleaner air (so that it is stronger when it has to fight off invading bacteria, dust and viruses). Healthier lungs have a better chance of avoiding common illnesses because they are less compromised. The human body fights invading particulates but eventually, these defenses wear down and give up, and this is when people are most susceptible to colds, influenza, pneumonia, viruses and respiratory infections.

In fact, given the well documented long-term negative impact of poor indoor air quality, the long-term health impact of improved indoor air quality could be even more important and substantial. By avoiding the damage and degradation of respiratory systems caused by these illnesses, students and teachers should be healthier and more able to fight off more serious health problems. Children without respiratory, allergy or asthma problems can enjoy more exercise and sports activities which will strengthen their health, reduce the risk of obesity and produce stronger, healthier adults. If you speak with career teachers who have lost 70% of their hearing due to repeat ear infections, you will find that many have other major health issues and asthma that was probably influenced by the high levels of indoor particulates they breathe every day in their school classroom.

Long-term studies focus on the fact that the lungs and respiratory systems of children are rapidly growing and developing up to age 18 or 20, and children spend 80-90% of their time indoors. This equates to more than 18,000 hours in school buildings—where air quality is known to be some of the worst because of the population density per square foot. So their delicate, developing lungs and respiratory systems are continually forced to deal with high levels of airborne particulates and repeat respiratory illnesses. The measured and documented lung damage by age 18 is directly proportional to the level of air quality they were exposed to during these critical growth years. Reducing this particulate exposure should give both children and teachers a healthier life with substantial reductions in health care costs.

Goal 6 – Recruit and Retain the Best Teachers

All school teachers deserve cleaner, healthier indoor air quality in their classrooms. Sadly, the reality is that most schools don't have the funds to implement these low-cost solutions. However, schools that do implement programs to aggressively filter classroom air will offer teachers a major incentive to work at their school and *stay* at their school. In some district exit interviews, up to 25% of teachers leaving a school system have cited declining health problems as the reason for leaving a particular school. Therefore, improving classroom air quality can help a school attract and retain their most valuable resource: experienced teachers.

Conclusion

School management is a combination of school boards, parent groups, administrators and teachers. By using Six Sigma, managers can focus their efforts on changing the items that will result in the biggest potential improvement. In this paper we have clearly demonstrated why any school's administrators, teachers and parents should evaluate the potential performance improvement they can achieve by cleaning up classroom air.

The actual outcome indicated for the sample school used in this paper shows that by improving indoor air quality with Purifans, the school reduced the annual number of sick days by more than 11 per student. Furthermore, government studies analyzing the total economic effect of illnesses caused by poor air quality estimate a cost of more than \$200 per day based on typical medical expenses and the cost to employers when parents have to miss work to care for sick children. This means that the average family in the first schools to implement cleaner classroom air may have saved as much as \$2,200 per year, per child, by avoiding these common illnesses. Since the 385 student school cited in this paper saved approximately 4,300 student sick days per year, the annual total savings could be well over \$500,000 and as much as \$860,000. So what other health and safety improvements could a school make that would produce such a substantial direct annual savings to the average family's health care costs?

Schools should ask their teacher health insurance providers to provide a recent history of the cause of health costs for their teachers. We estimate that more than 50% will be costs related to allergies, asthma and common respiratory related illnesses. One of the best ways to reduce the rising cost of health care is to implement Wellness Programs to avoid rising health care costs. No other program offers as much potential savings as the filtering of classroom air to remove harmful particulates. The cost of installing an in-classroom air filtration system is less than \$1,000. If annual health care expenses related to respiratory illnesses actually exceed \$4,000 or even \$5,000 per teacher, doesn't it make good sense to consider a Wellness Program for improving classroom air quality? How much does this save per year? What about the total of all savings that are created for the students' families and employers?

Even using substantially reduced assumptions and estimates for costs and results, the first year payback of cleaner classroom air quality appears to be 5 to 20 times the initial costs, and even more in later years when the only ongoing cost is related to filter changes and cleaning services.

If a school is in a state that funds schools based on attendance, the annual financial contribution to the school's operating budget could be 2 to 5 times the installation cost. Over the seven years a student spends in a typical Pre-K to 6th grade elementary school, the increase in state funding could be 14 to 35 times the initial installation cost. These funds are not the savings, but actual higher levels of funding from the state based on attendance. What school system wouldn't like to get extra state funding, improve their student test scores and provide substantial savings for teacher health care costs?

Six Sigma ROI Model

After implementing a change intended to produce an improvement in performance, we are then required to measure the performance improvement in order to calculate the potential payback. The spreadsheet below

is available by sending an email to stan@purifan.com and can be used by any school so they can apply their own actual numbers (highlighted in yellow) to calculate their own potential financial payback using various assumptions. The numbers shown in this spreadsheet are example numbers based on some existing experience and history in schools that have implemented a classroom clean air solution from Purifan. The numbers shown are for an elementary school with 385 students in a state that pays based on average daily attendance.

Assumptions used in the example are a 385 student school in a state with 185 school days. The attendance before installing Purifans runs 94.2% and after Purifans are installed it increases to 96.2 a 2% increase. It assumes attendance based funding is worth \$5,400 per child.

The assumptions are for 24 children per classroom and one Purifan for every 24 children. Initial cost is about \$19,000 or about \$49 per student. In the later years, the only cost is the filter change costs 2 times per year at \$50 per change or about \$10 per student per year, for an outside contractor to change them. If the facilities staff changed them, the costs would be a little lower.

Family cost savings estimates are using an estimated working salary for a parent of \$24,000 per year or \$92.31 per work day. Most government studies trying to set the real costs use a variety of adjustments but typically come up with an average daily cost for a sick elementary school child of about \$240 per day.

Payback to Parents, Employers and Insurance Companies

This shows about a 1,472% rate of return in the first year, over 5 years the total return is 40 times or 4,043% ROI to the families, employers and insurance company.

School ROI Estimates

The ROI for the school is estimated to be an increase in state funding of \$41,580 for the first year and \$207,900 over the first 5 years. This is 608% ROI to the school based on the estimated costs for 5 years. In addition the school could save \$2,880 in energy costs because of wind-chill cooling and heating benefits of air movement in the room. The school would also save an estimated \$24,026 in paid sick leave and substitute teacher costs because the teachers stay healthier.

The bottom line is that most schools will get a significant financial return with as little as a 1% increase in attendance.

Calculating the Financial Payback

Name of School:	
Number of Students	385
Annual School Days	185
Total Student Days in the School	71225
Cost of Respiratory Infection - 2 day	\$ 381.92
Days of School Missed for each URI	2
Projected Increase in Attendance	2.00%

What Does a URI Cost?

	Low Cost	High Cost
Doctor's Office Call	\$ 45.00	\$ 100.00
Office Testing	\$ -	\$ 60.00
Prescription Medicine	\$ 60.00	\$ 180.00
Two Missed Work Days	\$ 184.62	\$ 184.62
Total Cost of Illness	\$ 289.62	\$ 524.62

Parent's
Estimated
Salary
\$ 24,000
\$ 92.31
per day value

	No Purifans	With Purifans	Change
Total Number of Students	385		
Attendance Last Year	94.20%	96.20%	2.00%
Average Number of Children in School	362.67	370.37	7.70
Missed Sick Days	4,153.38	2,706.55	(1,446.83)
		Days	Avg Per
		Missed	Child
Reasons for Absenteeism	% of Total		
URI Illness Related Absences	85.0%	3,530.37	9.17
Other Type of Illnesses	2.0%	83.07	0.22
Car Accident or Injury	1.0%	41.53	0.11
Sports or School Trip	4.0%	166.14	0.43
Trip with Parents	5.0%	207.67	0.54
Unexcused absence	3.0%	124.60	0.32
Total	100.0%	4,153.38	10.79

With Purifans		
% of Total	Days Missed	Avg Per Child
77.0%	2,083.54	5.41
3.1%	83.07	0.22
1.5%	41.53	0.11
6.1%	166.14	0.43
7.7%	207.67	0.54
4.6%	124.60	0.32
100.0%	2,706.55	7.03

Before Purifans			
URI	Cost to	URIs in	URI Cost
Illnesses	Family	School	for School
4.58	\$ 1,751	1,765	\$ 674,165

After Purifans			
URI	Cost to	URIs in	URI Cost
Illnesses	Family	School	for School
2.71	\$ 1,033	1,042	\$ 397,877
First Year		First 5 Years	
\$ 276,289		\$ 1,381,444	
First Year		First 5 Years	
1472%		4043%	
First Year		First 5 Years	
\$ 718		\$ 3,588	

Projected Savings For School Families per Year
Health ROI 1 and 5 Years for Fewer Sick Days
Avg Savings Per Family 1 and 5 Years

	ADA	ADA	Gain		FIRST YEAR ROI	5 YEAR ROI
ADA Calculation	362.67	370.37	7.70	Potential		
Approximate Funding Per Student	\$ 5,400	\$ 5,400		Attendance Funding Gain	\$ 41,580	\$ 207,900
*ADA = Average Daily Attendance						
Total Funds	\$ 1,958,418	\$ 1,999,998	\$ 41,580	ADA ROI to School	222%	608%
One Purifan for every	12 Students/Purifan					
Number of Purifans	32	\$ 3,850	\$ 4,492			
Average Cost to School	\$525	Filter Changes	5 YR COSTS			
Total Cost of Purifans	\$18,769	\$ 3,850	\$34,169	Five Yr Assumes 2 Filter Changes & Clean per Year @ \$60 Each		
Cost of Purifans Per Student	\$48.75	\$10.00				
Cost of Purifans Per Student Per Year for 5 Years			\$ 17.75			

Annual Utility Bills for Classrooms	\$ 23,998	assumes \$2/sq ft in classrooms 22 x 34 feet
Estimated Savings	12%	
Potential Savings	\$ 2,880	

Energy Savings	\$ 2,880
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Number of Teachers	19
Average Sick Days per Teacher	8
Percent That are URI related	50%
Total Teacher Sick Days Saved	77
Average Teacher Salary	\$ 42,000
Cost of Paid Day of Sick Leave	227.03
Cost of Substitute Teacher	\$ 85.00
Potential Savings with Purifan	\$ 24,026.08

Teacher Sick Day Savings	\$ 24,026
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What Teachers Say About Cleaner Classroom Air

School Testimonials

"Just a note to tell you how much we use and appreciate the Purifan that you installed in our facility. It is very important to us that we offer our children an environment that is as free of particles and dust, as we can manage. We have tried several other methods to achieve this, but nothing we have tried, so far, matches the performance of your remarkable fan.

Our staff asked me to tell you that they particularly like the quietness of the system. It is very important in a learning environment like ours, that we keep background noises to a minimum.

I would certainly recommend this filtration system to other schools and home systems in the area"

Carol Eklund
Preschool Director
Montessori Children's House, Phoenix, AZ

By my second year in this building, I was receiving de-sensitizing shots twice a week for dust, mites, mold and mildew. I had numerous ear and respiratory infections. My husband and children began to encourage me to find another job. Being stubborn, and loving this school, I decided to give it one more year. I purchased two HEPA air-cleaners at the local hardware store, and completely eliminated chalk usage in the room. It did help...but certainly wasn't a cure-all.

Last year, a Purifan air filtering system was installed in my classroom. WOW! I felt the difference almost immediately. The room smelled better. The room stayed cleaner. Not one child in my class needed to use an inhaler during school hours the entire year. Absences from respiratory illness were minimal. I was not sick all year!

I am in a new part of the building this year, and really thought the air quality would not be a factor. But here it is the first part of October, and I am on my second round of antibiotics. One week ago a Purifan air-filtering system was installed in my new classroom, and I know it will make all the difference in the world! I am looking forward to another happy and healthy year! Thanks Purifan!

Glenna Weir
Pre-K Teacher – Blessed Sacrament, Wichita, KS

I have one little boy with chronic respiratory problems. At the beginning of the year, he was missing a lot of school. I myself was having horrendous problems with allergies. I'd spend around \$200 on antibiotics just for the infections. Heaven knows what my allergy medicine used to cost my insurance company! You could see the dust in the air and on all the surfaces. It was awful. On the desktops, computers, bookcases – you could feel that kind of grimy, gritty dirt. Even when the weather was nice, I'd still have to keep my door closed and run the air conditioning because of my allergies. After the school installed a Purifan Clean Air System, the dust in the air? The grim on the desktops? We don't have that anymore. The boy with bronchitis? He hasn't missed a day since the Purifans were installed. Not one day.

I was supposed to be taking a prescription allergy tablet everyday, but after about the first week with the Purifans, I quit taking my medication. I called my doctor, and he said, "Well by all means, if you don't need it, don't take it." Since Purifans have been installed in my room, I've taken one pill. My sinus infections are a thing of the past. My husband is really thrilled. My insurance company is probably thrilled, too! The results were positive, the district just ordered 54 more Purifans, with plans to add the systems to every classroom in the district.

Sheri Eberth
David Brewer Elementary School, Leavenworth, Kansas

Our building was built in 1943, You would not believe how much dust was in that classroom! A lot of my students suffer from allergies, and so do I. On days with high pollen counts, everything would be covered in no time. And many of us, including me, were miserable. I cleaned every surface in the classroom during Spring Break, and that week they installed the Purifan Clean Air System in my classroom. Once the systems were up, we kept them running 24/7. We'd been back from break about a week when it occurred to me: Hey, there's no dust on this television! I looked around, and there was no dust anywhere. Previously, dust had accumulated virtually everywhere within just a day or two. There was a difference that not only could you feel, but you could see.

After the Purifans were installed a parent was visiting my classroom, and asked me about the unique-looking fans. I explained how they worked and the mother said, "So that's what happened! Daniel was having a difficult time with his asthma this year, but in just the last month, he hasn't had to take his albuterol a single time." I also had a female student who had continually complained of headaches and not feeling well. Since Purifans came along, her complaints have gone away.

Jim Wolfe

Fourth Grade – Howard Wilson Elementary, Leavenworth, Kansas

Our absentee rate hovered near 10 percent. Under the No Child Left Behind mandate, we are required to maintain attendance at 90 percent or above. Anything we can do to help keep our children healthy and in class is a plus for everyone. We installed on Purifan Clean Air System in one classroom. The difference is more than a visible lack of surface dust. Students are breathing much easier now. And some have actually gone off of medication. We are so excited with the results we installed 54 Purifans throughout our entire school.

Jan Cox, Principal

Howard Wilson Elementary, Leavenworth, Kansas

This year a Purifan was installed in my classroom as a test room to evaluate its effectiveness. We have been extremely pleased for several reasons. The system is very quiet and provides a learning environment that is conducive to student achievement. Our room has stayed much cleaner with less dust. It is cooler in the hot months and warmer in the cold months. We maintain an average temperature of 73 degrees. We are puppy raisers for the C.A.R.E.S. program and have a dog in the classroom so the Purifan is great for eliminating smells and pet hair.

My students have said:

- It is not distracting.
- I have not been sick once this year.
- It is really quiet.
- My allergies are not so bad.
- I hardly ever sneeze.
- My coughing is really better this year.
- My Asthma is not affected in the classroom.
- My Asthma now feels better at school than in my home.

Our heating and air-conditioning system brings in and uses outside air which can be rather humid at times. The Purifan helps to eliminate the humid conditions and make our air clean and fresh. The quality of our air is wonderful; the Purifan does an excellent job! I would highly recommend the Purifan for all classrooms.

Cathy Crowell, 4th Grade Teacher
Collegiate School, Wichita, KS

Top 20 Reasons Schools Are Installing The Purifan Clean Air System in Classrooms

1. Purifans have cut illnesses and absenteeism for students and teachers by 61% – Students bring many particles into the room including mold, pollen, pet dander, insect particles, chalk dust, construction dust and other particles that are strong allergy triggers.
2. Purifans have the capacity to filter the classroom 40 times per hour – eliminating mold & pollen.
3. Purifans save energy with the all of the airflow benefits of a ceiling fan.
4. Purifans are quiet - The Purifan is quiet and won't bother classroom activities
5. Teachers and Students will feel better with fewer allergy symptoms and headaches. Students have a better attitude when breathing clean air. They are in a better mood for learning.
6. Productivity and mental aptitude Increases and scores on achievement tests can be 3-17% higher in schools with cleaner air, according to the EPA and teachers union websites.
7. Teachers and Students need less allergy medication reducing side effects like drowsiness, mental errors, mistakes and irritable attitudes or personality changes
8. Cleaner air reduces lung damage – Studies reported in NEJM show particles are creating permanent lung damage and reducing healthy lung capacity.
9. Teacher Health costs decrease – Clean air decreases sick days, doctor's visits and drug costs – healthier lungs can fight off attacks from germs, viruses and classroom illnesses.
10. Reduces Shared Illnesses – reducing the floating particles that help transmit contagious respiratory illnesses like flu, whooping cough, SARS, TB and colds.
11. Reduces the longer-term impact of classroom flu – Short term absenteeism is only part of the flu problem, children have symptoms and degraded learning performance for weeks.
12. Purifans reduce or eliminate classroom odors. Odors from people, soap, pesticides, dirty carpet, natural body odors, perspiration, rodents, cockroaches and decaying skin cells.
13. Purifans capture mold, pollen and even construction dust
14. Purifans mount in the ideal location – Purifans are the only air cleaner that mounts up, overhead in the ideal location to filter all the air in the room.
15. Purifans are lowest cost per CFM. Purifans clean 2,000 CFM versus 15 to 200 CFM with floor standing models and Purifans have the lowest filter and energy costs per CFM of air cleaned.
16. Rooms are cleaner – Purifans reduce dust on surfaces, making the school cleaner and requiring less dusting. Particles are captured and eliminated.
17. Purifans use safe technology, simple HEPA and activated Charcoal filters. No dangerous ozone or ions. The Purifan is MADE IN THE USA and supported by local dealers.
18. Purifans have a lifetime warranty – Purifans never wear out or break due to normal use.
19. Purifans have a satisfaction guarantee and trial program – Try it in your own school.
20. Purifans can reduce potential school PR problems dealing with air quality complaints.

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