

# ROI Calculations for a Texas School District Based on Increased Average Daily Attendance Funding by Reducing Student Sick Days With Classroom Air Purification Technology

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## Report Summary

Every time an elementary-aged child in a Texas public school misses a day of school due to an illness, the child falls behind in their work, parents miss work and a lot of health costs are created by this illness. The school loses about \$30 per sick day in state funding due to the impact on Average Daily Attendance funding. Health studies and actual school experience have shown that aggressively filtering the classroom air to improve air quality by reducing particulates will have a significant impact on student and teacher absenteeism due to respiratory related illnesses. In some schools the sick days were reduced as much as 61%. The cost of a lease-purchase for 3 years is about \$750 per classroom per year. After 3 years of lease payments the school owns the technology and the annual cost of filter maintenance drops to only \$165 per year or under \$10 per student per year. The funding impact on boosting attendance can offer as much as \$3,600 per year per classroom in increased ADA funding for the school district. This report helps schools estimate the potential ROI based on their own historical attendance rates, and various estimates of the percentage of sick days that might be reduced by installing this technology in their classrooms. Many other benefits have been reported in addition to higher attendance, including lower teacher health costs, lower teacher absenteeism due to illness, reduced spread of contagious illnesses including colds, flu and respiratory infections. Schools also reported significant increases in average grades, and scores on standardized tests. When children miss fewer school days and take less mind-numbing medicines, they perform better, keep up with class content and build a better foundation for the next grade. The ROI tables in this report allow schools to estimate their financial ROI based on number of students per classroom, their current attendance rates and projected improvements they might experience.

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## 1. The Cost of Sick Days Because of Absenteeism Impact on ADA Funding

Every day a student is home sick, the school district loses about \$30 per day in ADA funding. The total impact on funding can be calculated by using the tables below. The missed sick days for the average classroom is based on the student population in the classroom and annual absentee rate for the classroom or school building. The first table shown here calculates how many sick days are lost based on class size down the left margin and the attendance rate across the top of the chart. These are the days lost per 180 day school year.

Students	90.0%	91.0%	92.0%	93.0%	94.0%	95.0%	96.0%	97.0%	98.0%	99.0%
16	288	259	230	202	173	144	115	86	58	29
17	306	275	245	214	184	153	122	92	61	31
18	324	292	259	227	194	162	130	97	65	32
19	342	308	274	239	205	171	137	103	68	34
20	360	324	288	252	216	180	144	108	72	36
21	378	340	302	265	227	189	151	113	76	38
22	396	356	317	277	238	198	158	119	79	40
23	414	373	331	290	248	207	166	124	83	41
24	432	389	346	302	259	216	173	130	86	43
25	450	405	360	315	270	225	180	135	90	45
26	468	421	374	328	281	234	187	140	94	47
27	486	437	389	340	292	243	194	146	97	49
28	504	454	403	353	302	252	202	151	101	50

These sick days then must be turned into a financial loss by multiplying these days by the \$30 lost for these sick days. The chart below is the dollar value per school year lost due to these levels of absenteeism.

The cost of sick days using \$30 a day in ADA funding										
Students	90.0%	91.0%	92.0%	93.0%	94.0%	95.0%	96.0%	97.0%	98.0%	99.0%
16	\$ 8,640	\$ 7,776	\$ 6,912	\$ 6,048	\$ 5,184	\$ 4,320	\$ 3,456	\$ 2,592	\$ 1,728	\$ 864
17	\$ 9,180	\$ 8,262	\$ 7,344	\$ 6,426	\$ 5,508	\$ 4,590	\$ 3,672	\$ 2,754	\$ 1,836	\$ 918
18	\$ 9,720	\$ 8,748	\$ 7,776	\$ 6,804	\$ 5,832	\$ 4,860	\$ 3,888	\$ 2,916	\$ 1,944	\$ 972
19	\$ 10,260	\$ 9,234	\$ 8,208	\$ 7,182	\$ 6,156	\$ 5,130	\$ 4,104	\$ 3,078	\$ 2,052	\$ 1,026
20	\$ 10,800	\$ 9,720	\$ 8,640	\$ 7,560	\$ 6,480	\$ 5,400	\$ 4,320	\$ 3,240	\$ 2,160	\$ 1,080
21	\$ 11,340	\$ 10,206	\$ 9,072	\$ 7,938	\$ 6,804	\$ 5,670	\$ 4,536	\$ 3,402	\$ 2,268	\$ 1,134
22	\$ 11,880	\$ 10,692	\$ 9,504	\$ 8,316	\$ 7,128	\$ 5,940	\$ 4,752	\$ 3,564	\$ 2,376	\$ 1,188
23	\$ 12,420	\$ 11,178	\$ 9,936	\$ 8,694	\$ 7,452	\$ 6,210	\$ 4,968	\$ 3,726	\$ 2,484	\$ 1,242
24	\$ 12,960	\$ 11,664	\$ 10,368	\$ 9,072	\$ 7,776	\$ 6,480	\$ 5,184	\$ 3,888	\$ 2,592	\$ 1,296
25	\$ 13,500	\$ 12,150	\$ 10,800	\$ 9,450	\$ 8,100	\$ 6,750	\$ 5,400	\$ 4,050	\$ 2,700	\$ 1,350
26	\$ 14,040	\$ 12,636	\$ 11,232	\$ 9,828	\$ 8,424	\$ 7,020	\$ 5,616	\$ 4,212	\$ 2,808	\$ 1,404
27	\$ 14,580	\$ 13,122	\$ 11,664	\$ 10,206	\$ 8,748	\$ 7,290	\$ 5,832	\$ 4,374	\$ 2,916	\$ 1,458
28	\$ 15,120	\$ 13,608	\$ 12,096	\$ 10,584	\$ 9,072	\$ 7,560	\$ 6,048	\$ 4,536	\$ 3,024	\$ 1,512
29	\$ 15,660	\$ 14,094	\$ 12,528	\$ 10,962	\$ 9,396	\$ 7,830	\$ 6,264	\$ 4,698	\$ 3,132	\$ 1,566
30	\$ 16,200	\$ 14,580	\$ 12,960	\$ 11,340	\$ 9,720	\$ 8,100	\$ 6,480	\$ 4,860	\$ 3,240	\$ 1,620

## **2. Calculating the ROI on Reducing Sick Days and Boosting ADA Funding**

In order to calculate the ROI, each school has to gather two basic information items. These are the class size per classroom, and the prior years attendance percentage. These two items will help calculate the ROI of fewer sick days, and determine what is the minimum improvement in attendance needed to pay for the classroom air filtration technology.

The cost of the air filtration technology has two different cost levels. The first 3 years, the cost used in this study is the lease-purchase cost to lease, then purchase the technology, and to this amount we have to add the cost of replacement filters that are part of the operating expenses.

The lease-purchase rates we use are using a lease agreement and rate that offers a \$1 buy-out at the end of the three year lease. Then after this lease expires, the school owns the technology, and the ongoing costs drop to much lower levels to cover the periodic replacement of the filters used in the technology. Of course if capital purchase funding was available, buying the units would create a higher payback to the school in the first three years, and the only cost would be filter costs.

To illustrate this ROI threshold, we have used the costs for just one classroom, even though most schools will install the technology in 10 or 12 classrooms in the typical school building. The ROI math works the easiest if we focus on the impact on one classroom, because classroom population has an impact on the ROI payback. The technology cost is fixed for the classroom for each year, so if the classroom has 25 students the potential payback from reducing sick days is much higher than a classroom that has only 15 or 16 students.

To calculate the cost during the first 3 years, and then every year after that we have calculated the installed cost of the technology, and the annual filter changes. Then we checked on the cost of installing the technology using a lease program with a \$1 buyout at the end of three years. This helps the school put up a minimum cash amount of about \$130 per classroom to cover the first and last months lease payments, and then pay for the monthly lease rate. The annual lease cost during the lease purchase 3 year period would be about \$735 per year, per classroom.

Using the estimation of \$30 per day in ADA state funding, this means that if we can reduce the student sick days by 25 for the entire 180 day year. If there are 25 students in the class, we have to save one student sick day per student per year. In some actual schools that installed this technology the sick days saved per student was 11 days, not 1 day.

But the number of sick days per student is based on past year attendance. A 95% attendance rate means students miss an average of 9 school days per year. Most are due to sickness, but some are other events like accidents, vacations, weddings, funerals and other family issues.

Once the technology has been installed, it will immediately produce an improvement in attendance, and this will generate additional state funding that can be used to help pay the monthly operating costs caused by the lease and operation of the technology.

If the gains in attendance are great enough, then this technology actually becomes a revenue generator for the school. This means the cost of paying for the technology will be offset by increased Average Daily Attendance funding, and this can actually create a boost in funding that is significantly greater than the cost of the technology. This would create a net increase in school funding for the school.

Once the lease-purchase portion of the lease is completed in three years, the attendance improvement should remain, but the cost of filters is a very low \$165 per year, which means the additional ADA linked funding could generate a substantial increase in school funding based on improved attendance. This means to cover the cost would require a reduction of 6 student sick days and this would generate \$180 in additional ADA funding.

These charts are color coded, the light green is the attendance improvement needed cover the \$165 ongoing filter costs. The dark green numbers are the savings that cover the first three year cost levels of \$735 a year. The amount of money shown is the ADA funding generated. If the shading is yellow the ADA funding increases won't cover the \$165 increase in filter costs per year.

If the ADA funding is greater than the \$735 amount the difference over that amount is an increase in funding to the school.

### 3. The Estimated ROI With a 10% Reduction in Student Sick Days

**Table ROI\_10%** - This table shows the ROI levels if the rate of absenteeism drops by only 10%. The actual levels of reduction have been as high as 61% in some schools, but this ROI table uses only 10% fewer sick days. The left side column in the table shows the classroom population, the top row labels shows you the attendance the school achieve in the prior year. For example in a class with 23 students, and 94% attendance, the 10% savings would add \$745 per year in ADA funding. This would offset the \$735 lease cost for the first three years, and then be a net gain of \$580 in funding when the cost dropped to the \$165 annual filter only costs. That would be  $\$745 - \$165 = \$580$  in increase funding to spend on other costs in the school. This is a per classroom number so if 12 classrooms had identical class sizes the total annual increase in year four and later would be  $12 \times \$580 = \$6,960$  per year in increase funding from higher ADA levels.

% Sick Days Saved=		10%		The ADA funding with only 10% fewer sick days using \$30 a day							
Students	90.0%	91.0%	92.0%	93.0%	94.0%	95.0%	96.0%	97.0%	98.0%	99.0%	
16	\$ 864	\$ 778	\$ 691	\$ 605	\$ 518	\$ 432	\$ 346	\$ 259	\$ 173	\$ 86	
17	\$ 918	\$ 826	\$ 734	\$ 643	\$ 551	\$ 459	\$ 367	\$ 275	\$ 184	\$ 92	
18	\$ 972	\$ 875	\$ 778	\$ 680	\$ 583	\$ 486	\$ 389	\$ 292	\$ 194	\$ 97	
19	\$ 1,026	\$ 923	\$ 821	\$ 718	\$ 616	\$ 513	\$ 410	\$ 308	\$ 205	\$ 103	
20	\$ 1,080	\$ 972	\$ 864	\$ 756	\$ 648	\$ 540	\$ 432	\$ 324	\$ 216	\$ 108	
21	\$ 1,134	\$ 1,021	\$ 907	\$ 794	\$ 680	\$ 567	\$ 454	\$ 340	\$ 227	\$ 113	
22	\$ 1,188	\$ 1,069	\$ 950	\$ 832	\$ 713	\$ 594	\$ 475	\$ 356	\$ 238	\$ 119	
23	\$ 1,242	\$ 1,118	\$ 994	\$ 869	\$ 745	\$ 621	\$ 497	\$ 373	\$ 248	\$ 124	
24	\$ 1,296	\$ 1,166	\$ 1,037	\$ 907	\$ 778	\$ 648	\$ 518	\$ 389	\$ 259	\$ 130	
25	\$ 1,350	\$ 1,215	\$ 1,080	\$ 945	\$ 810	\$ 675	\$ 540	\$ 405	\$ 270	\$ 135	
26	\$ 1,404	\$ 1,264	\$ 1,123	\$ 983	\$ 842	\$ 702	\$ 562	\$ 421	\$ 281	\$ 140	
27	\$ 1,458	\$ 1,312	\$ 1,166	\$ 1,021	\$ 875	\$ 729	\$ 583	\$ 437	\$ 292	\$ 146	
28	\$ 1,512	\$ 1,361	\$ 1,210	\$ 1,058	\$ 907	\$ 756	\$ 605	\$ 454	\$ 302	\$ 151	
29	\$ 1,566	\$ 1,409	\$ 1,253	\$ 1,096	\$ 940	\$ 783	\$ 626	\$ 470	\$ 313	\$ 157	
30	\$ 1,620	\$ 1,458	\$ 1,296	\$ 1,134	\$ 972	\$ 810	\$ 648	\$ 486	\$ 324	\$ 162	



#### 4. The Estimated ROI With a 20% Reduction in Student Sick Days

**Table ROI\_20%** - This table shows the ROI levels if the rate of absenteeism drops by only 20%. The left side shows the classroom population, the top row labels shows you the attendance the school achieve in the prior year. For example in a class with 23 students, and 94% attendance, the 20% savings would add \$1,490 per year in ADA funding. This would offset the \$735 lease cost for the first three years and create a net funding gain of \$1,490 - \$735 = \$755.

After year four it would be a net gain of \$1,325 in annual state funding when the cost dropped to the \$165 annual filter only costs. That would be \$1,490 - 165 = \$1,325 in increase funding to spend on other costs in the school. This is a per classroom number so if the school installed this technology in 12 classrooms had identical class sizes the total annual increase in year four and later would be 12 x \$1,325 = \$15,900 per year in increase funding from higher ADA levels.

Even in the first three years during the lease-purchase cost period, the annual savings with 12 equipped classrooms would be \$755 x 12 = \$9,060 per year. Plus the savings of lower teacher health costs, lower substitute teacher costs, lower HVAC heating and cooling costs and lower costs to maintain computers and electronics used in these classrooms. In addition the school should have higher average grades, and higher scores on standardized tests.

% Sick Days Saved=		20%									
		The ADA funding with only 20% fewer sick days using \$30 a day									
Students	90.0%	91.0%	92.0%	93.0%	94.0%	95.0%	96.0%	97.0%	98.0%	99.0%	
16	\$ 1,728	\$ 1,555	\$ 1,382	\$ 1,210	\$ 1,037	\$ 864	\$ 691	\$ 518	\$ 346	\$ 173	
17	\$ 1,836	\$ 1,652	\$ 1,469	\$ 1,285	\$ 1,102	\$ 918	\$ 734	\$ 551	\$ 367	\$ 184	
18	\$ 1,944	\$ 1,750	\$ 1,555	\$ 1,361	\$ 1,166	\$ 972	\$ 778	\$ 583	\$ 389	\$ 194	
19	\$ 2,052	\$ 1,847	\$ 1,642	\$ 1,436	\$ 1,231	\$ 1,026	\$ 821	\$ 616	\$ 410	\$ 205	
20	\$ 2,160	\$ 1,944	\$ 1,728	\$ 1,512	\$ 1,296	\$ 1,080	\$ 864	\$ 648	\$ 432	\$ 216	
21	\$ 2,268	\$ 2,041	\$ 1,814	\$ 1,588	\$ 1,361	\$ 1,134	\$ 907	\$ 680	\$ 454	\$ 227	
22	\$ 2,376	\$ 2,138	\$ 1,901	\$ 1,663	\$ 1,426	\$ 1,188	\$ 950	\$ 713	\$ 475	\$ 238	
23	\$ 2,484	\$ 2,236	\$ 1,987	\$ 1,739	\$ 1,490	\$ 1,242	\$ 994	\$ 745	\$ 497	\$ 248	
24	\$ 2,592	\$ 2,333	\$ 2,074	\$ 1,814	\$ 1,555	\$ 1,296	\$ 1,037	\$ 778	\$ 518	\$ 259	
25	\$ 2,700	\$ 2,430	\$ 2,160	\$ 1,890	\$ 1,620	\$ 1,350	\$ 1,080	\$ 810	\$ 540	\$ 270	
26	\$ 2,808	\$ 2,527	\$ 2,246	\$ 1,966	\$ 1,685	\$ 1,404	\$ 1,123	\$ 842	\$ 562	\$ 281	
27	\$ 2,916	\$ 2,624	\$ 2,333	\$ 2,041	\$ 1,750	\$ 1,458	\$ 1,166	\$ 875	\$ 583	\$ 292	
28	\$ 3,024	\$ 2,722	\$ 2,419	\$ 2,117	\$ 1,814	\$ 1,512	\$ 1,210	\$ 907	\$ 605	\$ 302	
29	\$ 3,132	\$ 2,819	\$ 2,506	\$ 2,192	\$ 1,879	\$ 1,566	\$ 1,253	\$ 940	\$ 626	\$ 313	
30	\$ 3,240	\$ 2,916	\$ 2,592	\$ 2,268	\$ 1,944	\$ 1,620	\$ 1,296	\$ 972	\$ 648	\$ 324	

A school with fewer students per classroom has a lower ROI, and a greater number per classroom would have a higher ROI. It is also important to note that a school with poorer indoor air quality, and therefore higher sick days, would see a greater ROI because there are more sick days in this type of school. These schools have lower average attendance and have a bigger payback from cleaning the classroom air. Also low-income schools and schools with more minorities have higher respiratory sick days from allergies and Asthma according to CDC, EPA and other health studies.

## 5. The Estimated ROI With a 30% Reduction in Student Sick Days

**Table ROI\_30%** - This table shows the ROI levels if the rate of absenteeism drops by only 20%. The left side shows the classroom population, the top row labels shows you the attendance the school achieve in the prior year. For example in a class with 23 students, and 94% attendance, the 30% savings would add \$2,236 per year in ADA funding. This would offset the \$735 lease cost for the first three years and create a net funding gain of \$2,236 - \$735 = \$1,501.

After year four it would be a net gain of \$2,071 in annual state funding when the cost dropped to the \$165 annual filter only costs. That would be \$2,236 - 165 = \$2,071 in increase funding to spend on other costs in the school. This is a per classroom number so if the school installed this technology in 12 classrooms had identical class sizes the total annual increase in year four and later would be 12 x \$2,071 = \$24,852 per year in increase funding from higher ADA levels.

Even in the first three years during the lease-purchase cost period, the annual savings with 12 equipped classrooms would be \$1,501 x 12 = \$18,012 per year. Plus the savings of lower teacher health costs, lower substitute teacher costs, lower HVAC heating and cooling costs and lower costs to maintain computers and electronics used in these classrooms. In addition the school should have higher average grades, and higher scores on standardized tests.

% Sick Days Saved=		30% The ADA funding with only 30% fewer sick days using \$30 a day									
Students	90.0%	91.0%	92.0%	93.0%	94.0%	95.0%	96.0%	97.0%	98.0%	99.0%	
16	\$ 2,592	\$ 2,333	\$ 2,074	\$ 1,814	\$ 1,555	\$ 1,296	\$ 1,037	\$ 778	\$ 518	\$ 259	
17	\$ 2,754	\$ 2,479	\$ 2,203	\$ 1,928	\$ 1,652	\$ 1,377	\$ 1,102	\$ 826	\$ 551	\$ 275	
18	\$ 2,916	\$ 2,624	\$ 2,333	\$ 2,041	\$ 1,750	\$ 1,458	\$ 1,166	\$ 875	\$ 583	\$ 292	
19	\$ 3,078	\$ 2,770	\$ 2,462	\$ 2,155	\$ 1,847	\$ 1,539	\$ 1,231	\$ 923	\$ 616	\$ 308	
20	\$ 3,240	\$ 2,916	\$ 2,592	\$ 2,268	\$ 1,944	\$ 1,620	\$ 1,296	\$ 972	\$ 648	\$ 324	
21	\$ 3,402	\$ 3,062	\$ 2,722	\$ 2,381	\$ 2,041	\$ 1,701	\$ 1,361	\$ 1,021	\$ 680	\$ 340	
22	\$ 3,564	\$ 3,208	\$ 2,851	\$ 2,495	\$ 2,138	\$ 1,782	\$ 1,426	\$ 1,069	\$ 713	\$ 356	
23	\$ 3,726	\$ 3,353	\$ 2,981	\$ 2,608	\$ 2,236	\$ 1,863	\$ 1,490	\$ 1,118	\$ 745	\$ 373	
24	\$ 3,888	\$ 3,499	\$ 3,110	\$ 2,722	\$ 2,333	\$ 1,944	\$ 1,555	\$ 1,166	\$ 778	\$ 389	
25	\$ 4,050	\$ 3,645	\$ 3,240	\$ 2,835	\$ 2,430	\$ 2,025	\$ 1,620	\$ 1,215	\$ 810	\$ 405	
26	\$ 4,212	\$ 3,791	\$ 3,370	\$ 2,948	\$ 2,527	\$ 2,106	\$ 1,685	\$ 1,264	\$ 842	\$ 421	
27	\$ 4,374	\$ 3,937	\$ 3,499	\$ 3,062	\$ 2,624	\$ 2,187	\$ 1,750	\$ 1,312	\$ 875	\$ 437	
28	\$ 4,536	\$ 4,082	\$ 3,629	\$ 3,175	\$ 2,722	\$ 2,268	\$ 1,814	\$ 1,361	\$ 907	\$ 454	
29	\$ 4,698	\$ 4,228	\$ 3,758	\$ 3,289	\$ 2,819	\$ 2,349	\$ 1,879	\$ 1,409	\$ 940	\$ 470	
30	\$ 4,860	\$ 4,374	\$ 3,888	\$ 3,402	\$ 2,916	\$ 2,430	\$ 1,944	\$ 1,458	\$ 972	\$ 486	

A school with fewer students per classroom has a lower ROI, and a greater number per classroom would have a higher ROI. It is also important to note that a school with poorer indoor air quality, and therefore higher sick days, would see a greater ROI because there are more sick days in this type of school. These schools have lower average attendance and have a bigger payback from cleaning the classroom air. Also low-income schools and schools with more minorities have higher respiratory sick days from allergies and Asthma according to CDC, EPA and other health studies.

## 6. The Estimated ROI With a 40% Reduction in Student Sick Days

**Table ROI\_40%** - This table shows the ROI levels if the rate of absenteeism drops by only 20%. The left side shows the classroom population, the top row labels shows you the attendance the school achieve in the prior year. For example in a class with 23 students, and 94% attendance, the 40% savings would add \$2,981 per year in ADA funding. This would offset the \$735 lease cost for the first three years and create a net funding gain of \$2,981 - \$735 = \$2,246.

After year four it would be a net gain of \$2,071 in annual state funding when the cost dropped to the \$165 annual filter only costs. That would be \$2,981 - 165 = \$2,816 in increase funding to spend on other costs in the school. This is a per classroom number so if the school installed this technology in 12 classrooms had identical class sizes the total annual increase in year four and later would be 12 x \$2,816 = \$33,792 per year in increase funding from higher ADA levels.

Even in the first three years during the lease-purchase cost period, the annual savings with 12 equipped classrooms would be \$2,246 x 12 = \$26,952 per year. Plus the savings of lower teacher health costs, lower substitute teacher costs, lower HVAC heating and cooling costs and lower costs to maintain computers and electronics used in these classrooms. In addition the school should have higher average grades, and higher scores on standardized tests.

% Sick Days Saved=		40%								
		The ADA funding with only 40% fewer sick days using \$30 a day								
Students	90.0%	91.0%	92.0%	93.0%	94.0%	95.0%	96.0%	97.0%	98.0%	99.0%
16	\$ 3,456	\$ 3,110	\$ 2,765	\$ 2,419	\$ 2,074	\$ 1,728	\$ 1,382	\$ 1,037	\$ 691	\$ 346
17	\$ 3,672	\$ 3,305	\$ 2,938	\$ 2,570	\$ 2,203	\$ 1,836	\$ 1,469	\$ 1,102	\$ 734	\$ 367
18	\$ 3,888	\$ 3,499	\$ 3,110	\$ 2,722	\$ 2,333	\$ 1,944	\$ 1,555	\$ 1,166	\$ 778	\$ 389
19	\$ 4,104	\$ 3,694	\$ 3,283	\$ 2,873	\$ 2,462	\$ 2,052	\$ 1,642	\$ 1,231	\$ 821	\$ 410
20	\$ 4,320	\$ 3,888	\$ 3,456	\$ 3,024	\$ 2,592	\$ 2,160	\$ 1,728	\$ 1,296	\$ 864	\$ 432
21	\$ 4,536	\$ 4,082	\$ 3,629	\$ 3,175	\$ 2,722	\$ 2,268	\$ 1,814	\$ 1,361	\$ 907	\$ 454
22	\$ 4,752	\$ 4,277	\$ 3,802	\$ 3,326	\$ 2,851	\$ 2,376	\$ 1,901	\$ 1,426	\$ 950	\$ 475
23	\$ 4,968	\$ 4,471	\$ 3,974	\$ 3,478	\$ 2,981	\$ 2,484	\$ 1,987	\$ 1,490	\$ 994	\$ 497
24	\$ 5,184	\$ 4,666	\$ 4,147	\$ 3,629	\$ 3,110	\$ 2,592	\$ 2,074	\$ 1,555	\$ 1,037	\$ 518
25	\$ 5,400	\$ 4,860	\$ 4,320	\$ 3,780	\$ 3,240	\$ 2,700	\$ 2,160	\$ 1,620	\$ 1,080	\$ 540
26	\$ 5,616	\$ 5,054	\$ 4,493	\$ 3,931	\$ 3,370	\$ 2,808	\$ 2,246	\$ 1,685	\$ 1,123	\$ 562
27	\$ 5,832	\$ 5,249	\$ 4,666	\$ 4,082	\$ 3,499	\$ 2,916	\$ 2,333	\$ 1,750	\$ 1,166	\$ 583
28	\$ 6,048	\$ 5,443	\$ 4,838	\$ 4,234	\$ 3,629	\$ 3,024	\$ 2,419	\$ 1,814	\$ 1,210	\$ 605
29	\$ 6,264	\$ 5,638	\$ 5,011	\$ 4,385	\$ 3,758	\$ 3,132	\$ 2,506	\$ 1,879	\$ 1,253	\$ 626
30	\$ 6,480	\$ 5,832	\$ 5,184	\$ 4,536	\$ 3,888	\$ 3,240	\$ 2,592	\$ 1,944	\$ 1,296	\$ 648

A school with fewer students per classroom has a lower ROI, and a greater number per classroom would have a higher ROI. It is also important to note that a school with poorer indoor air quality, and therefore higher sick days, would see a greater ROI because there are more sick days in this type of school. These schools have lower average attendance and have a bigger payback from cleaning the classroom air. Also low-income schools and schools with more minorities have higher respiratory sick days from allergies and Asthma according to CDC, EPA and other health studies.

## **7. Additional Savings and Benefits of Cleaner Classroom Air**

In addition to the positive financial impact for the school district, the reduction of student sick days in children pre-K to grade 6 has a substantial financial benefit to the families, state Medicaid expenses, private health insurance costs, and the employers of the children's parents. While these financial savings do not directly benefit the schools funding, they do have an important positive impact on the families, the insurance providers and the employers in the local community.

The best way to lower health care costs is to prevent or reduce the illnesses that are causing these expenses and sick days to be incurred. This is a much better solution than reducing doctor and hospital reimbursements, or forcing patients to accept less expense and less effective medical treatments, tests or prescription drugs. Avoiding the costs by avoiding the illnesses offers a substantial financial benefit to the local families, employers, insurance companies and health care providers.

Studies by government agencies about the total cost impact of a sick day for an elementary school student exceeded \$300. This was the average over many illnesses and treatments and covered costs including over-the-counter medications, doctor's office visits when needed, testing when needed, treatment programs when needed, prescription drug costs, paid leave costs when parents used them and the lost value of the work product the employer lost when an employee had to stay home from work to care for a sick younger-aged child.

There are also government studies that link the cost to employers when parents care for sick children who have a contagious illness like the flu or respiratory infection. These parents occasionally contract the child's illness and bring it to the office. This impacts other employees who get sick and these illnesses have a negative impact on employee attendance and productivity on the job, costing employers additional money.

The EPA and CDC cite many studies that show aggressive filtering or cleaning the air in shared rooms like classrooms, hospitals, nursing homes, office areas, churches, theaters, waiting rooms, airports and daycares can reduce the airborne particle droplet transmission of contagious, common illnesses. Cleaning the classroom air can reduce the spread of many contagious illnesses like colds and flu, this means fewer students and teachers get sick, fewer parents miss work, fewer parents get sick caring for sick children, and fewer employees contract the illness from contagious parents who return to work infected with the virus-based illness or flu.

## **8. The Positive Impact on State Medicaid Spending**

The Medicaid savings for a state can be substantial. A large percentage of children get their health care paid for by government provided Medicaid and CHIP programs. These programs are expanding, and insurance rule changes are putting more and more children in the state-funded program since more and more companies are dropping their private health insurance programs for employees due the increase costs and rules that restrict lower cost options.

The annual spending per child enrollee in Texas in FY2009 was \$2,753 according to the Kaiser Health Foundation studies.

<http://kff.org/medicaid/state-indicator/medicaid-payments-per-enrollee-fy2009/?state=TX>

Children's number one chronic illness is Asthma. Asthma also is much more common in minority children, and also more common in low-income house holds where allergens may be higher. This means the payback to the state Medicaid program will be much higher when classroom air purifiers are installed in schools who serve these low-income communities, or schools with a higher incidence of minorities in their student populations. Because older school building may have more prior water damage and hidden mold, these schools can drive higher levels of illnesses and absenteeism. Equipping these older school building will typically help more children and students.

Newer, energy efficient school buildings, where windows cannot be opened, are also being reported to increase the problems related to illnesses linked to poor indoor air quality. Teacher's unions like the AFT have cited that newer green schools, and energy efficient school designs have produced a much higher level of teacher and student illnesses and respiratory issues for the teachers. These tighter buildings seem to create higher levels of airborne particulates with less natural ventilation caused by a structure that breathes more air, and uses more heating and cooling energy. The key factor to decide for most elementary schools is to look at the attendance reports. Since elementary aged children do not miss school due to truancy, it is almost always related to illness when they miss school. Parents want the children in school, and a lower percentage attendance in an elementary school may be the type of school building, new or old, that would benefit the most from classroom air filtration.

Any parent knows the most common sickness for young children is some form of respiratory illness or infection. Many of the more common costs are for allergy prevention, Asthma prevention, studies, breathing treatments and many variations of sinus, ear and respiratory infections. These are the key drivers for health care spending for younger children, and many of these costs are avoidable if the indoor air quality could be improved.



## 9. Important Requirements for Classroom Air Purification Solutions

While the CDC and EPA cite many health studies that prove that aggressive air filtration can reduce allergy related illnesses, the spread of common contagious illness and also link to many other health improvements in the areas of heart disease, learning performance and hardening of the arteries. The damage caused to the respiratory and circulatory system link to breathing air with poor air quality is damage that stays with the person into their adult years. Asthma, for example is linked to as much as \$200,000 additional lifetime medical costs for a person through their lifetime.

These studies where filtering the air really worked has some very important technology requirements. The primary technology requirement was that the air filtration solution had to provide 10 to 12 air changes per hour in the occupied room. That means all the air in the room has to pass through the filters five or six times each hour. This level of air filtration is hard to produce in the classroom, but some products achieve and even exceed this key performance measurement.



There are also many studies that show that air purifiers with less than 10 to 12 air changes per hour were tested and DID NOT produce any measurable improvements in symptoms or reduction in sick days. So small, non-performing air purifiers are a waste of money and energy. The air changes per hour has to exceed 12 to get a meaningful impact on health and absenteeism.

The second key performance requirement in a classroom is quiet operation. The teacher's primary teaching tool is their voice. A loud, annoying high speed fan makes it difficult for students to hear and understand the materials being presented in the classroom. If a teacher has to strain to "talk over" the noisy air conditioner or air purifiers in the room, they strain their voice and wind up with symptoms such as a scratchy or sore throat and may reduce their amount of talking which usually reduces their effectiveness as a teacher.

Some classroom air purifiers use a patented technology to produce the air changes per hour, and have extremely quiet operation. This is the ideal solution for classrooms. These designs are also located on the ceiling, in the middle of the room, so the airflow pattern covers all the air, and all the students in the classroom. Many

floor or desk model air purifiers have little impact on the air very far away from the purifier. This may benefit the teacher's area, but will have little or no impact on the students. If these floor and desk models are turned up to higher fan levels they sound like vacuum sweepers or leaf blowers and this make too much noise to be used in a classroom. Running them on lower, less noisy levels cuts down their air cleaning rates up to 90%, making the benefits even less.

The third key issue to consider is the life of the technology. Since many air purifier designs have a limited one year warranty, and many have a history of failure in 24 to 36 months, the costs go up for replacement units or service on broken units. A non-performing or broken air purifier will not benefit students or teachers. Some designs offer a lifetime warranty and have been in service for 10 or more years. These designs also replace the entire filter system with each service making the 10 year old unit perform exactly like a brand new unit performs.

Air Purifier designs that use electrostatic plates get dirty over time and stop performing. Many times these high-voltage systems produce ozone in the classroom something the EPA says is very unhealthy. So a simple design and moves the air through disposable, not washable, filters is the best design for long-term usage and performance.



The fourth key to selecting an air purifier for a school or daycare is the energy consumption. These units should be left running 24 hours a day to keep the tiny airborne particulates from invading the classroom and settling onto surfaces. So the designs must have low power designs to keep the operating costs low. Those that mount to the ceiling and move air, will also improve the efficiency of air conditioning and heating systems, which can offset their energy usage by lowering the cost of heating and cooling the classroom during the school year.

The fifth key to selecting the right technology is can the technology be moved. Many school districts have the hope of building a new school building in the future. Some may have plans in 3 to 5 years, and feel that enhancing the air quality in their old, existing school may not be worth the investment. These air purifier technologies can be moved to the new building, or another school in the district and this increases the motivation to equip existing schools since the investment will still have

value in another building or the new school building. Those with lifetime warranties may have good resell value to another school district.

Whole building filtration systems built into the HVAC system have not produced the level of absenteeism improvement and lowered the spread of seasonal colds and flu. The primary reason is these whole building solutions do not meet the criteria of 12 room air changes per hour. Many HVAC systems shut down once temperature and humidity requirements are achieved. The airborne contaminants and particulates that are causing the serious health problems are brought into the classrooms on the skin, clothes, shoes, hair and belongings that the students and teachers bring into the room. The air that enters the room also contains contaminants. The key role the in classroom air purifier plays to move these contaminants into the systems filters and deliver a constant stream of filtered, particle free air to the students requires the systems be in the rooms and run continuously to create the health benefits and effects.