



IAQ & Schools:

*Creating An Indoor
Environment That Is Truly
A Learning Environment*

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Overview:

- Current condition of schools and occupants
- Mechanics of “how we learn”
- What is “Indoor Air Quality”
- Does Poor IAQ Affect Student Performance?
- How Do We Improve IAQ?



Review: School Facts

- Average age of U.S. schools: 42 years
- 1 in 5 Americans in school buildings each day
- EPA: Half of schools have ventilation issues
- Estimated cost to repair schools: \$127 - \$248 Billion
- 75% of schools have outlived their predicted life



Review: School Facts

- Asthma has reached epidemic proportions in U.S.
- 1 in 13 school-aged children has asthma
- Asthma is leading cause of absenteeism



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- Concentration / lack of distraction



What is IAQ?

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- Particulates
- Mold
- Formaldehyde & other VOCs
- Ozone
- MCS vs. BRI vs. SBS



Causes of SBS

- Inadequate ventilation
- Chemical contaminants from indoor sources
- Chemical contaminants from outdoor sources
- Biological contaminants



Solutions to SBS

- Pollutant source removal or modification
- Increasing ventilation rates
- Air filtration

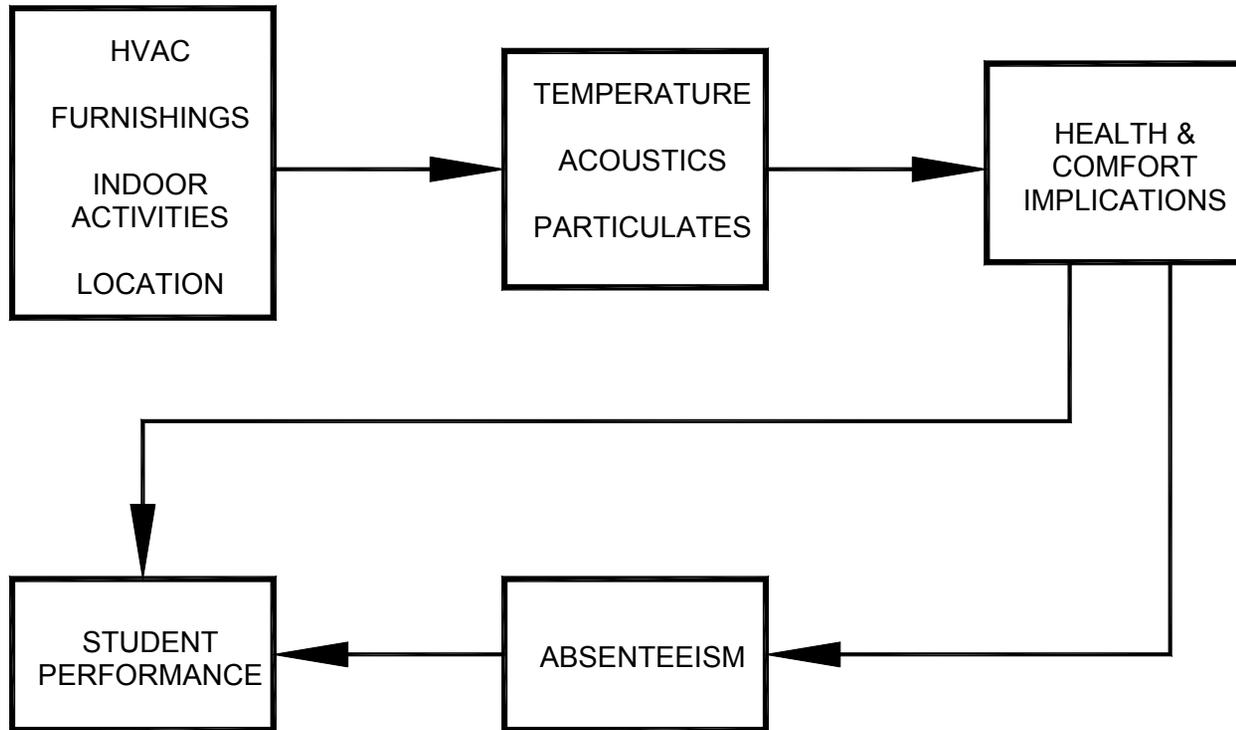


Balancing Energy and IAQ

- Fan horsepower
- System pressure
- Free cooling opportunities
- Innovative solutions



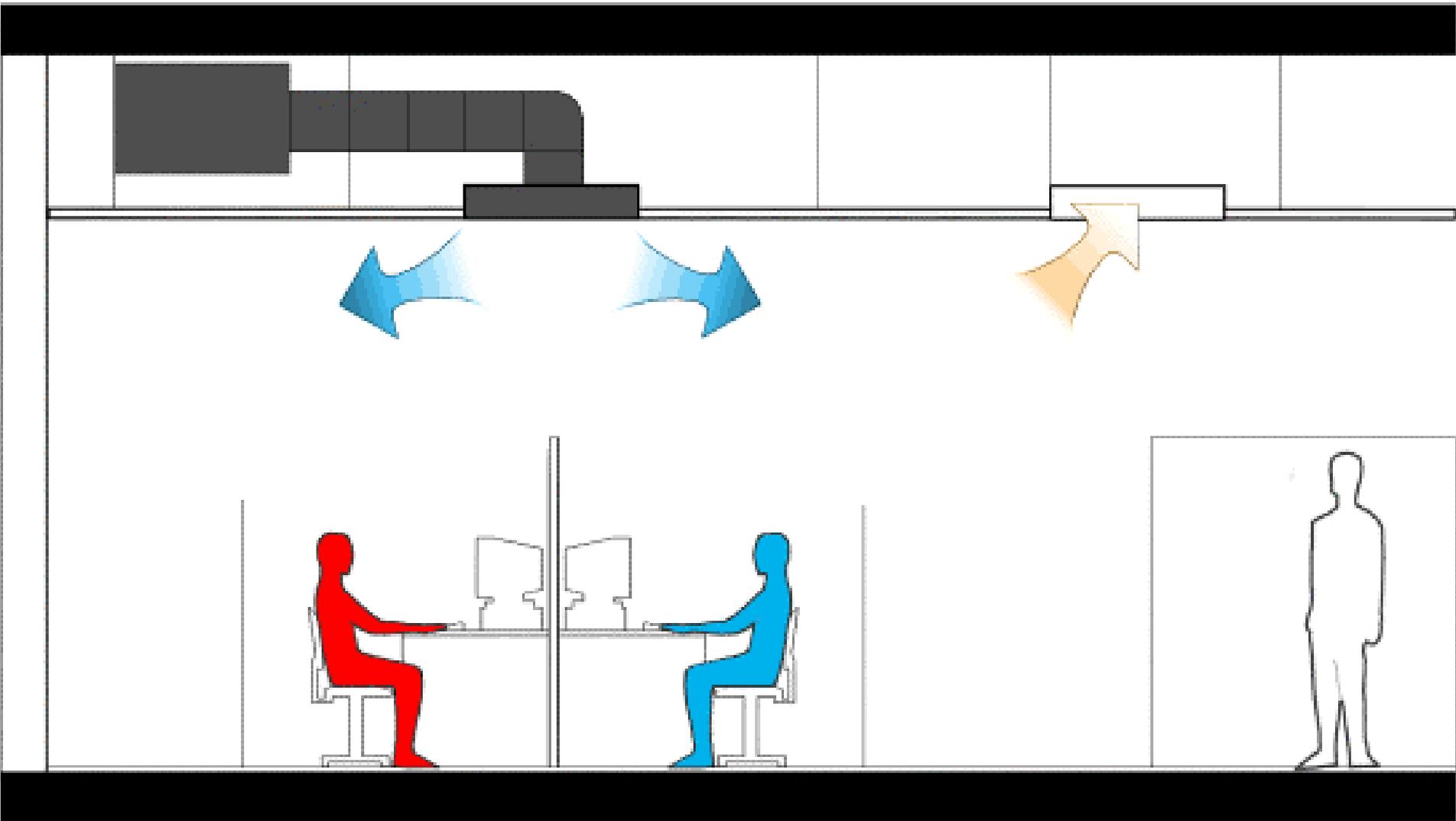
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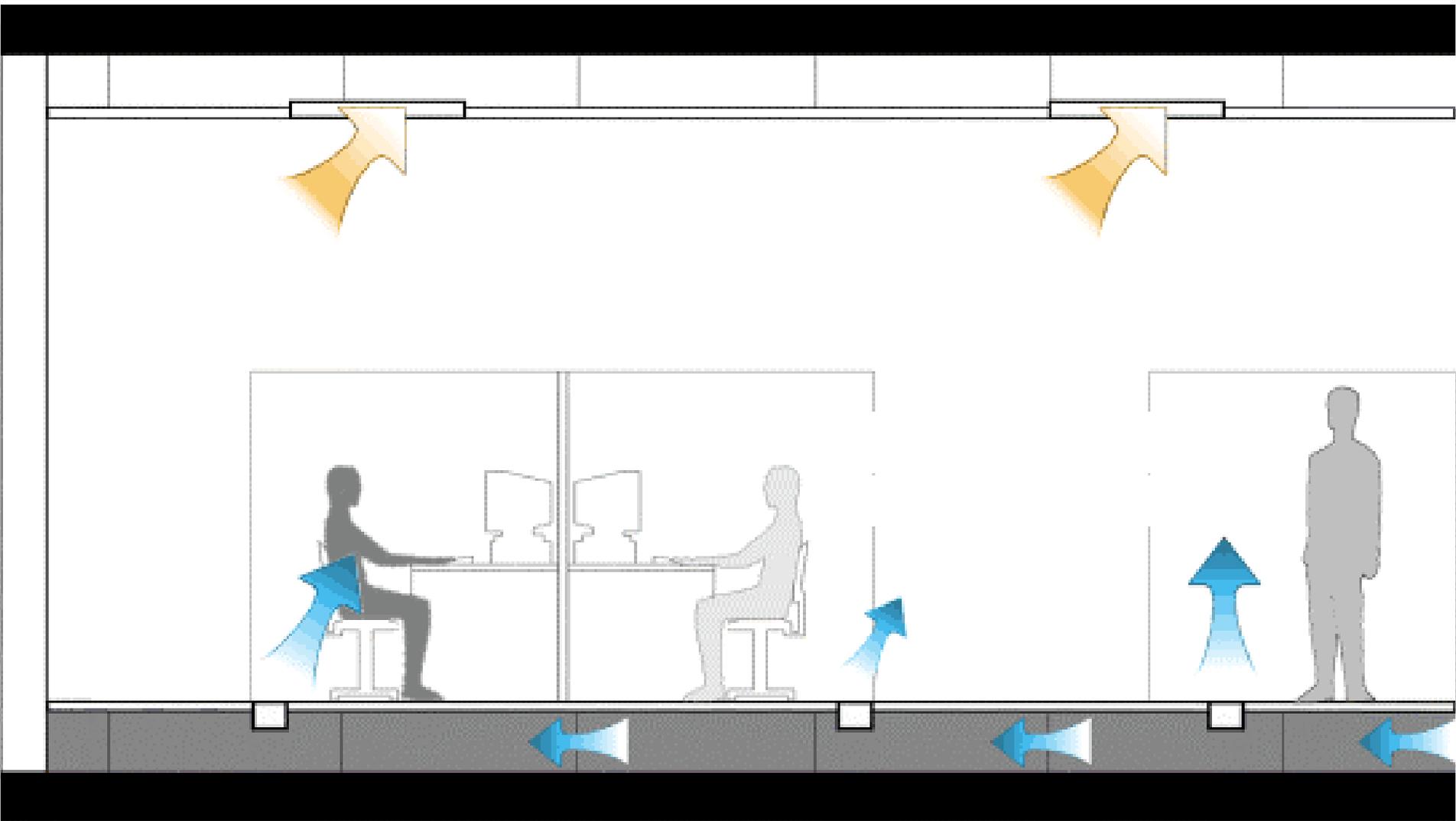




Does Poor IAQ Affect Student Performance?

- Temperature Control
- Past: viewed as a “matter of comfort”
- Present: classified as an environmental stressor
- New research: temperature–performance link







Benefits of Displacement Ventilation

- Cleaner Air: 20-30% fewer particulates
- Consistent temperature profile
- Quieter system
- Lower operating costs
- Lower capital costs
- Flexible technology



How do we articulate issues of IAQ and Schools?

- Engineering
- Capital & Operating Cost
- Biology & Physiology
- Student Performance: Test Scores
- Human Resources (Recruitment / Retention)
- Legal / Liability Aspects



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- Re-visit our mission in designing schools



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Conclusion:

- Re-visit our mission in designing schools
- Good engineering design must include proper commissioning and periodic re-commissioning
- Must use best available technology to ensure energy efficiency and good IAQ