

Academic Performance

- Four Factors that Affect Academic Performance
 - Human comfort
 - Indoor Air Quality
 - Lighting
 - Acoustical Comfort

Academic Performance

- Human Comfort
 - How does classroom temperature affect student outcomes?
 - Reduces illnesses
 - Fewer student and teacher absences
 - Affects student's ability to concentrate
 - Studies show productivity gains from improved temperature controls
 - Density
 - Too many bodies in room HVAC not designed for the additional heat loads
 - Overcrowding in general

Academic Performance

- Indoor Air Quality
 - Adequate & appropriate ventilation
 - Increased outside air
 - Adequate air movement
 - Improves learning, productivity and health effects
 - Reduction of asthma and allergy triggers caused by
 - Clutter
 - Moisture
 - Chemical toxins
 - Biological agents

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- Daylighting
 - Student performance is enhanced by natural light.
 - Student with the most daylighting progress 20% faster on math tests and 26% on reading tests than those with the least.
 - Students in classrooms with the most daylighting were found to have 7% to 18% higher scores than those with the least

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- Acoustical Comfort
 - Ability for students to hear the teacher and the other students
 - This ability or inability to hear directly affects student performance.
 - Fewer distractions caused by outside noise
 - Typically, children do not fully develop the ability to sort sounds from background noise until they are teenagers.
 - Single event noise – such as sirens

Academic Performance

- Studies, Reports & Publications
 - **Human comfort**
 - ASHRAE Standard:
http://www.ashrae.org/content/ASHRAE/ASHRAE/ArticleAltFormat/2003691613_347.pdf
 - **Indoor Air Quality**
 - Tools for Schools EPA:
<http://www.epa.gov/iaq/schooldesign/index.html>
 - **Lighting**
 - Heschong Mahone Group daylighting studies 1999, 2001 & 2003:
<http://www.h-m-g.com/projects/daylighting/projects-PIER.htm>
 - **General**
 - Earthman – Prioritization of 31 Criteria for Building Adequacy – 2004:
http://www.aclu-md.org/aTop%20Issues/Education%20Reform/Earthman_Final.pdf

Academic Performance

- Studies, Reports & Publications
 - **“Greening America’s Schools: Costs and Benefits”**
 - The study by Gregory Kats, entitled "Greening America's Schools: Costs and Benefits," was sponsored by the American Federation of Teachers, the American Institute of Architects, the American Lung Association, the Federation of American Scientists, and the US Green Building Council. It entailed a detailed analysis, using conservative and prudent financial assumptions, of 30 green schools built in 10 states between 2001 and 2006. Its complete text can be found at:
<http://www.cap-e.com/ewebeditpro/items/O59F11233.pdf>