

Acoustics in Schools



WorldGBC believes in green buildings for everyone, everywhere. Schools are no exception. We call for schools that are energy efficient, have low greenhouse gas emissions, and schools which are designed and operated for children's health, wellbeing and performance.

To help, Better Places for People has produced a series of briefing notes, focusing on four features of indoor environmental quality. These are intended for school board decision-makers, as well as school designers and facility managers, to share how design and operation features affect students' health and, in turn, their academic performance. By combining health, wellbeing and low carbon operation, we can ensure students spend their days in truly green school buildings.

PROBLEM:

Poor acoustics in schools can negatively affect children's health and academic performance.

PREVALENCE:



of UK schools are adjacent to sources of external noise, including: 1



Motorways



Airports



Railways

SOLUTION:

Thoughtful school design and operation can improve acoustics and improve student health and performance. This can also most often be done without increasing greenhouse gas emissions.

What are acoustics?

Acoustics, or noise are typically measured using:

- + The **background noise level**, measured in decibel (dB)
- + **Reverberation time**, which measures the time a sound can travel in a room (a low reverberation time is desired to minimize echo and disturbances).



Acoustics affects children's health and comfort

Poor acoustics in classrooms can directly impact student health and behaviour: 2



Hearing Loss



Changes in Heart Rate



Higher Blood Pressure



Decreased Wellbeing & Higher Stress Responses



Attention Deficit Hyperactive Disorder (ADHD) & Aggressiveness



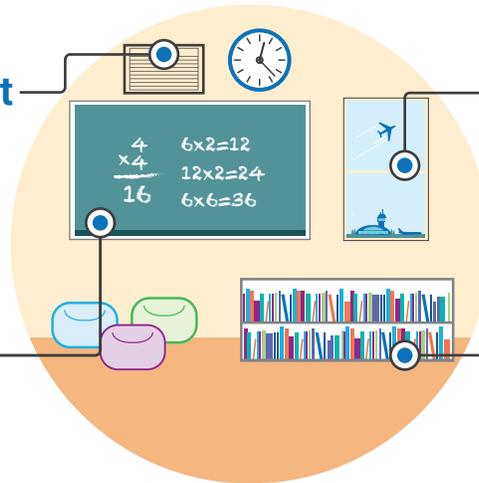
Sleep Disturbance, Fatigue & Irritability

Acoustics affects children's performance at school

Internal sources of noise

↓ **Lower student achievement** scores were recorded in Florida schools with loud HVAC systems compared to students in quieter classrooms 3

✎ **For every 10-dB increase** in noise, the language and math scores of French students decreased by 5.5 points 4



External sources of noise

⋯ Students in a UK school located in a flight path misheard **1 in 4 words**, affecting language acquisition skills 5

↓ **Lower reading levels** were recorded in students located near a major New York airport 6 and London's Heathrow Airport, compared to those in a quieter location 7

A truly green school has good acoustics and low carbon emissions, achieved through:

- **Locating new schools** away from permanent external noise sources, which can improve acoustics and increase the option of using natural ventilation, where the climate allows.
- **Optimising insulation** in existing schools, which can reduce external noise and noises from internal sources outside the classroom and reduce energy cost.

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