

Acoustical Stupidity

Noisy classrooms result in distracted students who learn less.

By Patti Edgar

Elementary school classrooms can be as loud as shopping malls or busy intersections, worrying researchers who say the noise hurts children's performance in school.

A British study released last week is the latest study to show that 'classroom babble', combined with the drone of air conditioners, the hum of traffic, and the roar of airplanes, affects students' learning.

"Students sometimes don't do well, not because they didn't study hard, not because they aren't intelligent, but because they were influenced by noise levels," says Tao Jiang, a professor at Halifax's Dalhousie University who studied the issue.

"We always make sure you can see clearly and you have good books, but we never emphasize the importance of hearing properly."

Researchers from two British universities studied sound levels in the classrooms of 2,000 children from ages 7 to 10 in London. Then they had the students write tests in varying noise levels.

Classroom noise affected the test results of most of the students, especially older children and children with special needs.

Tests involving language skills suffered the most. In spelling tests of 20 words, classroom noise reduced the number children got right by three or four. Noise outside the classroom also affected their concentration, slowing down their learning.

"I was surprised by the relationship between noise and the children's performance," said Bridget Shield, a professor of acoustics at South Benak University in Britain. "There's a lot of anecdotal evidence that children are affected by noise, but to carry out extensive testing and find the results statistically was very satisfying."

The schools surveyed in England had average noise levels of 72 decibels Ba, a measurement that relates to how humans hear sound. That's as

loud as standing next to a busy intersection.

While Canadian researchers will begin measuring noise levels in Ottawa schools in the fall, Montreal professor Michael Picard says most schools likely have noise levels at about 55 decibels. That's equal to the noise in a shopping mall.

Both those numbers are higher than the standard set by the World Health Organization, which calls for a maximum exposure of 35 decibels in classrooms and 55 in the playground.

The noisiest classrooms are likely in portables and 'open concept' schools. And while school boards have added walls to a dozen open concept schools, they are a fad left over from the 1970's that one Ottawa researcher calls "acoustical stupidity."

There needs to be more convincing evidence to get people to pay attention to the problem," said Mr. Bradley. "Obviously, schools don't have much money. If you want to spend money on quieting their ventilation systems, they are going to have to save on books, computers, or something. So you need a strong argument."

Children are especially susceptible to noise. For the past two decades, scientists have known that loud areas such as airports and industrial sites stress children. Young students are also easily distracted.

"Little kids are still growing language-wise," said Mr. Jiang. "Adults don't have to hear the whole sentence — they only need to catch the important words. But kids need to hear the whole thing or they don't understand it."

Researchers say noise in classrooms also leads to 'teacher syndrome' — strained vocal chords from trying to teach above the din.

(Adapted with permission from the Ottawa Citizen, May 6, 2002)

Hearing the Teacher

By Amanda Onion

A University of Kansas analysis found that the speech intelligibility rating in most U.S. schools is 75% or less, meaning listeners with normal hearing can understand only 75% of spoken words.

The main culprits in classroom noise (besides boisterous students) are heating and ventilation systems. Adding filters to ventilation systems can dampen noise. Widening air ducts also helps, since slow-moving air makes less noise than air flowing swiftly through narrow pipes.

Another hindrance to hearing is reverberation, or how much sound is echoed in a room. Under proposed new U.S. guidelines, reverberation in a typically-sized classroom must be kept below six-tenths of a second, meaning sound would be completely absorbed within that time.

For the same reason that train and subway announcements are often hard to understand, speaking up or using a microphone in a classroom with high resonance often only creates more confusing noise.

Rugs can help this problem, if they're thick enough. But most effective is installing a fibrous material like pressboard below the ceiling. The air pocket created between the ceiling tiles and the actual ceiling absorbs sound.

Another way to improve reverberation levels is to alter the shape of the classroom. An architect at Rensselaer Polytechnic in New York has conducted surveys and discovered that people find it easier to hear in trapezoidal rooms than in rooms designed in a typical shoebox shape.

Many European nations have already tackled the problem. Germany, Britain and Sweden all have mandatory acoustic standards for their classrooms.