

# Study shows background noise affects test scores

November 2 2011, by Deborah Braconnier

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(Medical Xpress) -- A new study presented at the *162nd Meeting of the Acoustical Society of America* shows that students testing scores are negatively affected by background noise, but not the noise you would expect. The background noise affecting test scores is not loud classroom disruptions or traffic noise, but the humming that comes from school air conditioning and heating systems.

While previous studies have shown that noise in the classroom is a [distraction](#), they have always looked at more obvious noises, such as schools near airports.

Lauren Ronsee from the U.S. Army Engineer Research and Development Center was interested in seeing how more subtle noise, such as the humming from the air conditioning and heating units, played a role in test scores.

Researchers collected data last year from 58 empty second and fourth grade classrooms in an Iowa school district, measuring the volume. They then looked at the test scores from students in each classroom and what they found was that kids who spent most of their time in the louder classrooms produced lower [test scores](#) on standardized [reading comprehension](#) exams.

In another study, they repeated the volume collection in 67 empty classrooms in Nebraska public schools, but their results varied. Fifth grade students showed lower scores in louder rooms but the third grades

saw no relationship. Those taking math exams showed no difference in scores.

The American National Standards Institute sets a recommendation for classroom [background noise](#) not to exceed 35 decibels. However, the researchers found that the Iowa classrooms had ranges of 36 to 50 decibels and the Nebraska schools were between 28 and 62 decibels. This research shows that in order for a student to perform their best on exams, the background noise needs to be below 28 [decibels](#), or about the same as a whisper.

The researchers believe that this studies shows that more effort needs to be taken to enforce the American National Standards Institute's recommendations. They also suggest that new schools be built with air conditioning and heating systems that are quieter in order to provide an optimal learning environment for children.

**More information:** Abstract online: [asa.aip.org/web2/asa/abstracts ... arch.oct11/asa9.html](http://asa.aip.org/web2/asa/abstracts...arch.oct11/asa9.html)

### *Abstract*

This research investigates relationships between unoccupied classroom acoustical conditions and elementary student achievement. Acoustical measurements were gathered in all of the third and fifth-grade school classrooms (67 total) in a public school district in north-eastern Nebraska, USA. Traditional classroom acoustic parameters, including background noise level and reverberation time, have been correlated to the standardized achievement test scores from students in the surveyed classrooms. Binaural impulse response measurements were also conducted in a subset of the rooms (20 total) and correlated to the student achievement scores. Acoustical metrics calculated from the binaural impulse response measurements include speech transmission index, distortion of frequency-smoothed magnitude, interaural cross-

correlations, and interaural level differences. The results from this research indicate that scores on fifth-grade student language and reading subject areas are negatively correlated to higher unoccupied background noise levels. Also, the distortion of frequency-smoothed magnitude, which is a perception-based acoustics metric, was significantly related to the student language achievement test scores.

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