

More on Classroom Noise

Reduction of classroom noise in order to improve children's learning environment has to be approached from several directions, of which control of internal noise and control and of break-in from external sources are the principal ones. Air conditioning noise is a major problem in many North American classrooms, representing the main internal noise source. Responding to this, a recent ASHRAE Winter Meeting included a highly successful and up-to-the-minute Seminar on Classroom Noise, stressing the need for quieter HVAC systems in order to achieve improved classroom levels.

By following a few simple design guidelines, it is possible to significantly reduce the impact of one major contributor to classroom noise, the school's HVAC system.

Children's progress in learning is closely connected with the intelligibility of speech in the classroom. Learning problems therefore arise from excessive noise. The effects are compounded for children with hearing loss, which is very common during periods of ear infection, which occur for children assessed as having 'normal' hearing.

There are many young children who have trouble hearing. Childhood hearing loss is more common than most people think and can interfere with learning, particularly in noisy classrooms. A key factor to quieting classrooms is eliminating excessive noise from the school's HVAC system.

Children's hearing loss fluctuates due to recurring ear infections, which can range from very slight to moderate and averages at around 20dB. A 20dB decrease in hearing level is similar to what you would experience if you covered your ear canals with your fingers. This decrease in the hearing level is significant for learning, especially during the critical years when children are learning to read. Children without hearing loss also need a quieter learning environment than that required by adults, especially the younger children, as do children with learning disabilities or where English is their second language. Traditional classrooms are noisy places with noise levels commonly measured between 50dBA and 60dBA, sometimes higher. At 60dBA of noise in the room, children can barely hear the vowels in the teacher's normal vocal level and will miss most of the consonants. Expecting teachers to shout throughout lessons is not an acceptable solution,

although this does happen in noisy classrooms. And 10% of American teachers are said to visit a speech therapist at some point in their careers!

By following a few simple design guidelines, it is possible to significantly reduce the impact of one major contributor to classroom noise, the school's HVAC system.

Having decided on an acceptable noise criterion, care must then be taken to design the HVAC system and select the equipment to meet that level. Amongst ways to achieve quiet systems are:

- Design ductwork for low velocity.
- Isolate the supply fan and motor from the fan cabinet, preferably on springs.
- Specify materials to minimize noise, such as duct liner or sound traps in ducts.
- Walls and windows must have adequate isolation, with construction breaks where necessary.

It is also important to locate components to minimize noise. For example, locate rooftop units above hallways and cloakrooms, not above classrooms, and put the compressor and condenser fan outside the classroom. Once the HVAC system is installed it is essential to ensure the system is balanced and is not delivering more air than necessary so that no one diffuser has to handle excessive air flow.

Examples of how a classroom HVAC system can be designed to achieve an acceptable level (for example NC-30 criterion) using currently available technology and materials were given in the Seminar.

A central HVAC unit serves a wing of six classrooms, each receiving 2,000 cfm of conditioned air. The main supply duct is located above the corridor and each classroom has a variable-air volume (VAV) box located above the classroom ceiling near the entry door. The supply air is provided from four ceiling diffusers and a return air transfer duct is provided between the classroom ceiling plenum and the corridor ceiling plenum. The primary noise control features for this system include an efficient supply fan with minimum noise generation, a sound attenuator in the main supply duct system close to the fan, a VAV box for minimum radiated noise, and a 2 in (5

cm) thick duct liner in the low pressure ductwork between the VAV box and the supply diffusers. This system was shown to meet NC-30 in the classroom with a predicted noise level of 36dBA.

A dedicated HVAC unit is located in a closet within the classroom. In this situation the supply air distribution is identical to the central system example above, except there is VAV box. The main noise control features with this system are: an efficient fan with minimum noise generation, chilled water coils for cooling to eliminate the need for a compressor in the unit, using the closet as a return air plenum, a sound attenuator in the closet between the unit and the return air grille, and an

acoustically lined plenum at the fan discharge to attenuate the fan noise before it enters the supply duct above the classroom ceiling. This system was also shown to meet the NC-30 criterion with a predicted noise level of 37dBA.

Whilst there are many ways to achieve the recommended acoustical design goals for classrooms, these two examples illustrate the benefits of forethought and careful design. The important thing is to recognize the problem, then find the solution that best meets the needs of the situation. This is a serious issue that can be addressed with conventional products and materials and must not be overlooked by the system designer.

HYPOCRISY

Helen Brinton was at the centre of a new row yesterday after distributing election leaflets saying she had “played a key role in helping to combat anti-social behaviour”. Neighbours of the Peterborough MP accused her of “incredible hypocrisy”, pointing out that police have twice been called to deal with noisy disturbances involving her. She apologised for the latest incident two weeks ago, when police arrived at the house she shares with Alan Clark, political editor of Meridian TV, at 7am. Neighbours complained of screaming and shouting. But later she told the Peterborough Evening Telegraph: “I have nothing to apologise for.” Gilbert Benn, chairman of the management company for her flat in Park Road, Peterborough, said: “I can’t believe Helen Brinton is campaigning against antisocial behaviour when I have sent her letters of complaint about her own anti-social behaviour. She replied that she was being victimised because of her politics. Residents have to think about noise levels. The residents in her block are mainly elderly and one has a pacemaker.” A Peterborough council spokesman said: “We will investigate any complaints.” Mrs Brinton could not be contacted for

comment. Phil Scott, her agent, said: “The police have never taken any action following complaints against Helen. And she has served on a select committee dealing with anti-social behaviour.”

AVIARY

A large aviary in our neighbour’s garden, within 60ft of our house, contains lots of canary-type birds and parakeets. While the songs of the canary-type birds are mostly endurable, the parakeets emit shrieks that can be heard even through our doubleglazing. The parakeets start at 4.15am (ie, first light), making sleep impossible. The Noise Act 1996 offers no comfort. We sometimes, in exasperation, throw stones at our fence, which startles the birds for a short time. We have tried imitating birds of prey and blowing a foghorn, all to no effect. What can we legally do, given that climbing over the fence and strangling the creatures is of course, not on?

SINGING CHEF

An Italian restaurateur who serenades his customers has been ordered to keep his doors and windows closed to prevent noise pollution disturbing the

neighbours. Gino Tancredi, who serves dishes prepared to traditional recipes created by his mother, includes such classics as O Sole Mio and Volare in his repertoire. Guests at Gino’s in Stonehaven, near Aberdeen, regard it as part of the entertainment. But following complaints, the council has ordered him to keep the restaurant windows and doors closed, as a condition for planning consent for a kitchen extension. Mr Tancredi 45, who also enjoys crooning along with Dean Martin, and salsa dancing, said: “I make the customers happy.” One neighbour in Anne Street said: “Gino’s not quite Pavarotti and he does tend to be loud.”

NEIGHBOURS

A single mother of seven whose family were branded “neighbours from hell” has failed at the High Court to stop an eviction notice. Salisbury district council in Wiltshire decided to evict Anne McDonagh from her home in Seth Ward Drive, Bishopdown, after receiving 130 complaints about noisy and violent behaviour. Mr Justice Jackson rejected her claim that she had not received a fair hearing, but halted the eviction pending an appeal.