Background Noise and Classroom Design

Thursday, June 14, 2018

Author(s)

Lucy Erickson

The views expressed in this post do not necessarily represent the views of the American Association for the Advancement of Science, the National Science Foundation, or the United States Government.

The original version of this post was published at The Learning Scientists (http://www.learningscientists.org/blog/2017/9/13-1) on September 13, 2017.

This is the first in a series of posts, which all focus on a different type of noise and distraction, and their effects on learning.

Imagine you are studying for an important exam. Would you rather study for it in the library or the crowded, noisy cafeteria? You probably said the library, and that would be the smart choice. The negative effects of noise are numerous: noise can increase stress, frustration, and even blood pressure (1). In addition to effects on health, the effects that noise has on cognition and learning may be especially relevant to classroom, daycare, and home contexts. There is evidence from studies with adults that noise can disrupt thinking,
reasoning, and other cognitive processes, and the experience of struggling to concentrate in noisy environments is one that is universally familiar.

However damaging noise may be to adult performance, there is good reason to believe that the negative impact of noise is even worse with infants and young children, and this has been borne out by a growing body of research (e.g., (2 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4844837/)). Given how central learning is to early childhood development, and how much of knowledge transmission occurs through speech, the fact that infants and children are less equipped to understand and learn from speech in the presence of background noise is perhaps particularly concerning (e.g., (3 (https://asa.scitation.org/doi/abs/10.1121/1.1570443)). Consequently, limiting background noise in children's environments should be a critical priority if the goal is to create optimal learning environments.

In light of the evidence showing the negative effects of noise, why has there been an increase in the use of open classrooms and workspaces for both children and adults? The idea behind open classrooms and workspaces was that removing walls would increase collaboration. Although increasing collaboration may be a worthy goal, an unintended consequence of removing walls is that it results in very noisy workspaces. This is an example of how one type of evidence is used to justify an educational change without consideration of other factors.

Unfortunately, research shows that even non-open, walled daycares and classrooms are often noisy—louder than the recommendations established by the American Speech-Language-Hearing Association (4) (https://www.asha.org/uploadedFiles/elearning/jss/6173/6173Article4.pdf), (e.g., (5 (https://eric.ed.gov/?id=EJ505107))). They also have more reverberation than is ideal, which is a kind of smearing or prolonging of sound that happens when sound bounces off walls and other surfaces and makes speech harder to understand. Both reverberation and noise levels are problematic, and especially in combination, but noise volumes in particular have been shown to be extremely detrimental to learning (6 (https://asa.scitation.org/doi/abs/10.1121/1.427932)). Even more concerning is that classroom noise level estimates are typically taken when the classrooms are empty, measuring things like noises from heating and cooling and other constant types of machine-generated sounds. When classrooms are filled with children, they are even louder. On top of this, the talking, shrieking, laughing, and other sounds made by children and teachers can be highly distracting and have been demonstrated to make listening harder than other noises such as the hum of an air conditioner (e.g., (7 (https://asa.scitation.org/doi/abs/10.1121/1.4921677))).

How can you minimize the noise in a classroom?

- Use soft materials such as curtains, pillows, and wall-hangings to absorb the soundwaves that bounce around the room and cause reverberation.
- Use smaller classrooms and class sizes to allow children to be closer to the teacher and allow the teacher’s voice to be louder in relation to some of the other background noises. Although one approach might be to ask teachers to speak more loudly and more clearly, this has its own difficulties as it can lead to teacher vocal strain.
- As new buildings are designed, take into account increasing knowledge of the dangers of noise to design better floor plans and use sound insulating materials for construction.
- Time lawn mowing and other noisy maintenance activities to coincide with lunch or other less critical teaching moments.

The line of research described here is an example of how cognitive science research can be useful in thinking about ways to improve how children learn in the classroom. This research suggests it may...
be useful to regulate the noise levels found in classrooms, daycares, and other early learning environments. However, like many of the findings from cognitive science, this work is largely not known to education practitioners and state and local decision-makers. In addition, although research clearly indicates that high levels of noise should be limited, a full understanding of some of the reasons why young children find it so challenging to understand and learn from speech with background noise may inform other aspects of best practices for classroom design.

Because basic auditory skills mature quite early, some researchers suspect that poor attention skills may be the culprit for difficulties listening in noise (e.g., [8](http://journals.sagepub.com/doi/abs/10.1177/0963721417709087)); [9](https://link.springer.com/article/10.3758%2FAPP.71.4.822); [10](https://www.sciencedirect.com/science/article/abs/pii/S0021992407000196)). Unlike basic auditory skills, the ability to selectively direct attention is a skill that develops slowly in children, and is of vital importance to learning (e.g., [11](https://www.sciencedirect.com/science/article/pii/S0022096515001101)); [12](https://onlinelibrary.wiley.com/doi/abs/10.1111/1467-8624.00496)). If difficulties with attention are in large part responsible for problems listening and learning with background noise, this has implications for how we think about the environments that will result in the best learning outcomes for children. In addition to being noisy, classrooms and daycares can be chaotic and visually disorganized, and research is just starting to suggest that this kind of visual clutter or disorganization may also have a big impact ([13](https://www.sciencedirect.com/science/article/pii/S0163638316300315)); [14](https://link.springer.com/article/10.3758%2Fs13423-013-0466-4)). It may be that beyond merely regulating noise levels in children’s early learning environments, it would be advisable to create guidelines to minimize distractions, both auditory and visual in nature. In my next post, I’ll talk about the visual environment, and how visual “noise” may affect children in similar ways to auditory noise.

Image credit: Wikimedia

Source URL: https://www.aaaspolicyfellowships.org/blog/background-noise-and-classroom-design

List of links present in page

- http://www.learningscientists.org/blog/2017/9/13-1
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4844837/
- https://asa.scitation.org/doi/abs/10.1121/1.1570443
- https://eric.ed.gov/?id=EJ505107
- https://asa.scitation.org/doi/abs/10.1121/1.427932
- https://asa.scitation.org/doi/abs/10.1121/1.4921677
- https://link.springer.com/article/10.3758%2FAPP.71.4.822