Children struggle to hear and teachers struggle to teach in new open-plan learning environments

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Many of us would remember our days in primary school sitting in a classroom with four walls, 20 to 30 other students, and a teacher instructing us from the front. Recently, however, some schools have been converting classrooms to more open-plan environments, where several classes share the same space. Classes are still divided into class bases of 20-30 students with their own teacher, but all of these classes are in the same room with minimal or no walls separating them, which results in 50, 90 or even 200 children in the one area.

These "innovative learning environments" are emerging largely due to teaching methods now focussing on child-directed learning with the teacher as the facilitator rather than the instructor[1]. These classrooms are thought to better facilitate group work and children's social development. Additionally, they are seen to benefit the teachers by promoting the sharing of skills, ideas and experiences, and by allowing team-teaching which is believed to create a more cooperative and supportive atmosphere[2].

But that's a lot of children in one area, doesn't it get noisy?

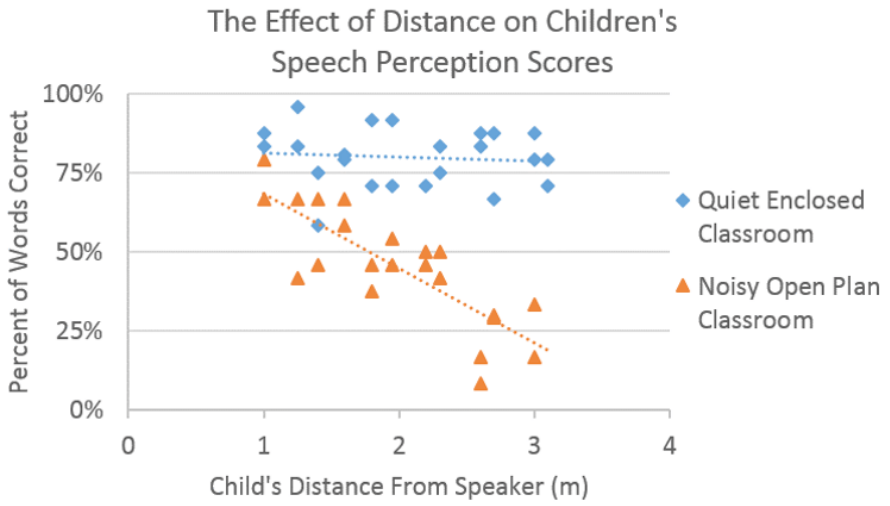
Yes, noise can be a big problem in open-plan learning environments, especially the high noise levels coming from the other classes sharing the same space[3]. This noise is particularly problematic when a class is trying to engage in critical listening activities, which is a vital time for children to be able to hear and learn the new concepts they are being taught. Research shows this direct instruction is essential for young children to learn the basic literacy and numeracy skills first before they can engage in more child-directed learning[1].

Our recent study of four different-sized Sydney schools found that most children were annoyed by the noise coming from the other classes in the open-plan area. Additionally, 50-70% of the children surveyed said they could not hear their teacher very well, or at all, when the other classes were doing noisy group work activities[4].

When objectively assessing 5-to 6-year-old children's speech perception (i.e. ability to hear words in sentences) in these four classrooms, we found that children in the noisiest open-plan classrooms had significantly lower speech perception accuracy and slower response times than children in an enclosed classroom. Distance from their teacher was also a major factor[5]. In the quieter enclosed classroom, children's speech perception scores were consistently high (approximately 80%), irrespective of how far they were seated from the teacher. However, in the noisiest open-plan classroom, children's scores dropped from 75% at the front to less than 25% at the back, and the children in this classroom also took significantly longer to process the sentences[5,6]. These findings are very concerning and likely to severely impact these children's learning. Not only that, but it is exhausting for the children trying to concentrate amid the noise.

What about the teachers?

It's not only the students in open-plan classrooms who suffer. Teachers from the open-plan classrooms we visited were more distracted by noise and found



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speech communication significantly more difficult than the teachers from enclosed classrooms. These teachers also needed to elevate their voices more and experienced vocal strain and voice problems more often than the teachers in the enclosed classrooms[7]. Some teachers in the open-plan classrooms had to leave the school or even the teaching profession due to vocal health issues.

So what do these findings suggest for open-plan learning environments?

On average, children spend 45-75% of their time at school listening and comprehending, so it is important that the acoustic learning environment enables students to be able to discriminate their teacher's and classmates' speech from other irrelevant noises in the classroom.

Our findings suggest that open-plan classrooms that are unable to control the noise from adjacent classes are not appropriate learning environments for children. Acoustically treated enclosed spaces are much more likely to provide the listening environments needed for children to be able to hear and understand their teacher.

If innovative learning environments are strongly desired, then they need to be purpose-built with proper acoustic treatment and, most importantly, have enclosed spaces or at least operable walls that can be closed when a class needs to engage in critical listening activities. Quiet rooms are also essential in these spaces so children who have particular difficulty working in noisy conditions can quietly work away from the other students. This includes children who have special educational needs, such as attention deficits, hearing impairments, auditory processing disorders, language delays, and English as a second language as they are likely to be even more affected by the noise[8]. Additionally, teachers need to be trained in how to teach effectively in different classroom environments and how to look after their vocal health.

There is a real need for outreach programs to educate teaching professionals, architects, designers, clinicians, parents, and children on the appropriate acoustic conditions for educational spaces and how to achieve them in all schools. This will help enhance children's learning and improve teachers' vocal health and wellbeing.

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