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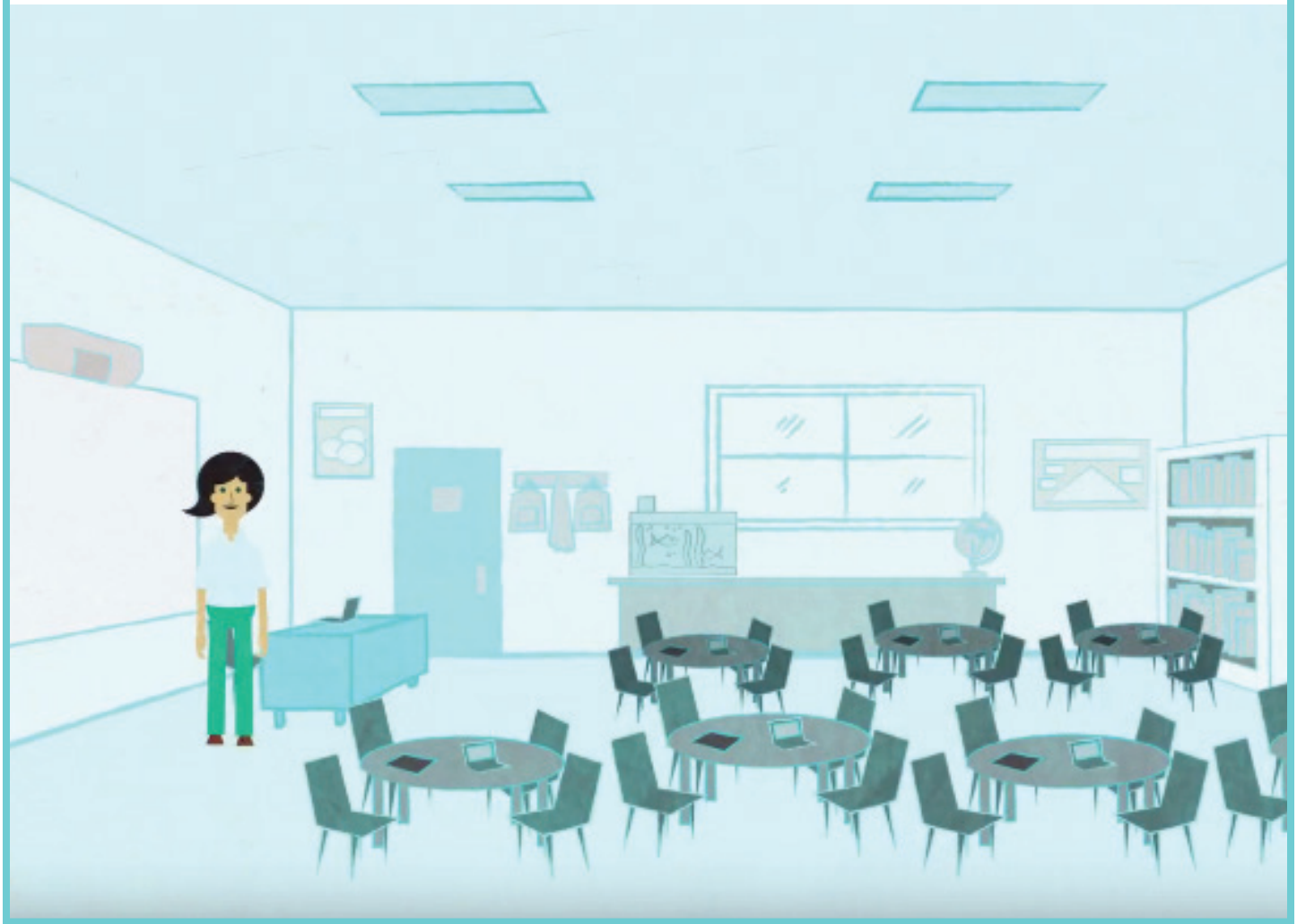

8 Reasons It's Hard to Learn in Your Classroom

The biggest obstacle to classroom learning could be the classroom itself.

Even with excellent teaching and great administrative support, there are some obstacles to learning that seem impossible to eradicate. In fact, they're so common they've become clichés: student attention will wander, teachers have to raise their voices to communicate, behavior problems are lurking in the back of the room.

But when the average student misses 25% of what a teacher says,[1] these aren't just occupational challenges; they're urgent flaws with real impact on outcomes. It's not that students are inherently lazy. Or that teachers aren't trying hard enough. It's the fact that teaching — even in our age of multimedia — requires that students spend 45% to 60% of their school day involved in the listening process[2]. And as we'll see in this paper, the typical classroom environment is hostile to listening.

Unfortunately, because sound is invisible, teachers and administrators often fail to make the connection between a student's comprehension of auditory information and:

- Decreased performance
- Reading deficiencies
- Delayed language acquisition[3]

In this guide, you'll learn how to recognize obstacles to learning in the classroom, in common teaching styles, and perhaps even in students' brains — and how to overcome them.

[1] Crandell, C., & Smaldino, J. (1994). "An Update of Classroom Acoustics for Children with Hearing Impairment." The Volta Review, 96,291-306.

[2] Rosenberg, G., Blake-Rahtner, P., Heavner, J., Allen, L., Redmond, B., & Phillips (1999). Improving classroom acoustics (ICA): A three-year FM sound-field classroom amplification study. Journal of Educational Audiology

[3] Speech Language and Audiology Canada http://sac-oac.ca/sac-work/classroom-acoustics

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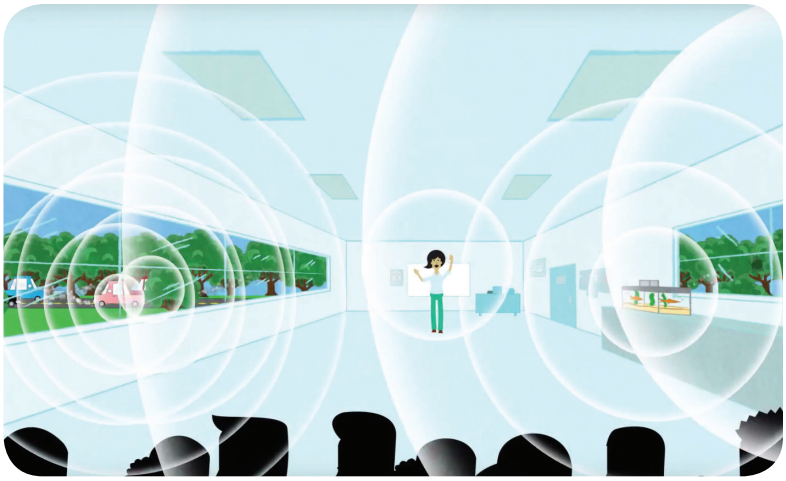
Your classroom almost certainly fails acoustics standards



Most classrooms don't meet the minimum acoustical guidelines from the American National Standards Institute (ANSI). One assessment found that less than 10% of Canadian Grade 1 classrooms have ideal listening conditions.[4] That's really bad for students.

Noise levels are too high

For students to listen effectively, ANSI recommends that noise levels in unoccupied classrooms be no louder than 30 to 35 decibels (dB). But noise levels in the average unoccupied classroom range from 45 dB to 60 dB. Add a teacher and 25 students to the room, and the noise level jumps to between 55 and 75 dB[5]!

Background noise in classrooms has many causes:

- heating, ventilating, and air-conditioning (HVAC) systems
- tables, chairs, and children's feet
- hallway noise
- external sources such as playgrounds, construction, highways and airports

The loud "teacher voice" is still too low

The difference between the loudness of a teacher's voice and the background noise level is described by signal-to-noise ratio (SNR). SNR is a critical component of classroom acoustics because it affects students' ability to understand what they hear. A positive SNR means the teacher's voice is, on average, louder than the background noise; a negative SNR means the noise is actually louder.

For students to hear clearly, the SNR should be +15 dB — that is, the teacher's voice should be at least 15 dB higher than the background noise.

Sadly, the SNR in most classrooms ranges from at best +5 dB down to a dismal -20 dB, leaving students struggling to understand the teacher. The higher the background noise level of the classroom, the poorer the reading scores exhibited by students in that classroom.[6]

The higher the noise level, the poorer the reading scores

Reverberation is too long

The teacher's voice can reflect off hard surfaces in the classroom. That usually ends up blurring her words' meaning. We measure reverberation as the time it takes for a reflected signal to drop by 60 dB, and in classrooms this time should be no more than 0.6 seconds.

But reverberation times of one second or more are common in many classrooms. And that can make it difficult for students to understand the teacher clearly.[7]

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[4] Speech Language and Audiology Canada http://sac-oac.ca/sac-work/classroom-acoustics

[5] DiSarno, N. J., Schowalter, M., and Grassa, P. (2002). Classroom amplification to enhance student performance.

[6] Green, K., Pasternak, B., & Shore, B. (1982). Effects of aircraft noise on reading ability of school age children. Archives of Environmental Health, 37, 24–31.

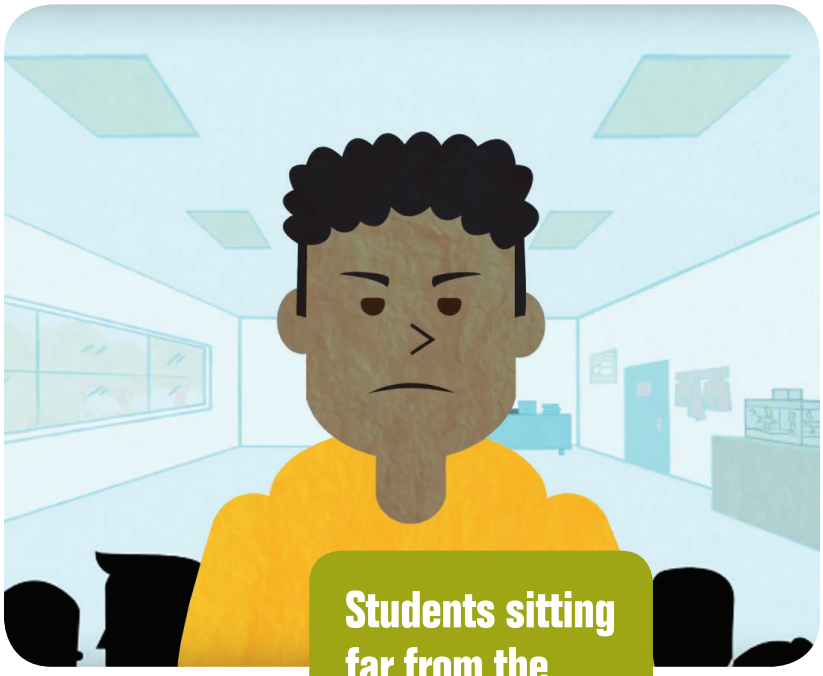
[7] Palmer C. Hearing and listening in a typical classroom, From Language, Speech & Hearing Services in Schools, July 1997

2 Students at the back miss more than you think

Did you know that students sitting farthest from the teacher can miss up to 40% of what's being said?[8] That's with completely normal hearing. It's no wonder the back of the classroom is notorious as a haven for inattentive and poorly-performing students.

A student's ability to learn has a lot to do with how far he or she is from the teacher. Students sitting 6 feet/2 metres away from a teacher have been shown to understand 89% of what the teacher is saying, but double the distance and their comprehension drops to 55%. Double it again to 24 feet (7 metres) and you can expect students to score just 36% correct on a word-recognition test.[9]

In a modern classroom, it is physically impossible for every student to sit a few metres away from the teacher. That means students sitting in the middle or back of the classroom are at a disadvantage. Even as the teacher moves about the classroom, every student periodically sits in the worst seat.



Students sitting far from the teacher can miss up to 40% of what's being said.

[8] Crandell, C., & Smaldino, J. (2000). Classroom acoustics for children with normal hearing and with hearing impairment

[9] Crandell, C., & Bess, F. (1986). Speech recognition of children in a 'typical' classroom setting.

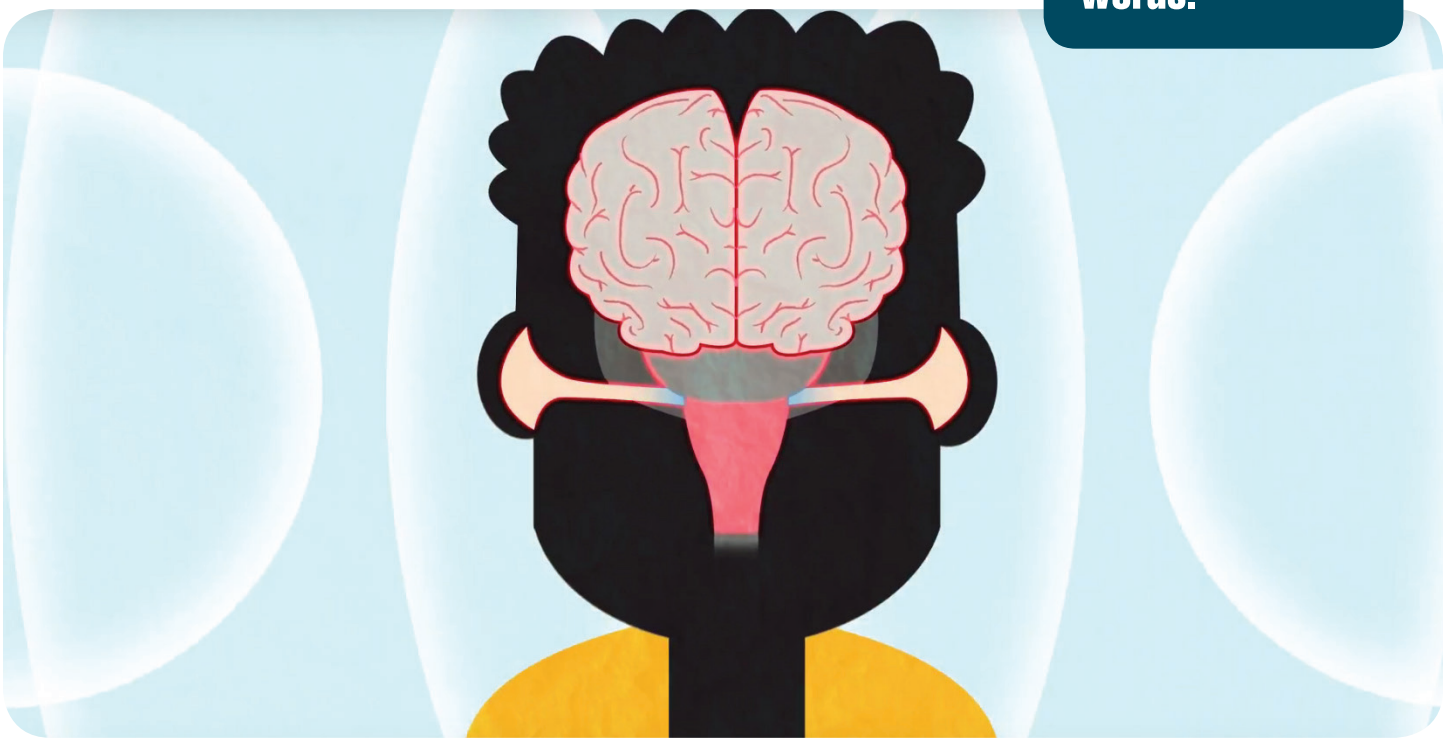
3 Your youngest students are probably suffering the most

The very real obstacles posed by the physical classroom are made greater by young students' brains. The fact is that students under about age 14 are measurably worse at understanding language than adults in the same listening conditions.

The Speech-Language and Audiology Canada website explains that "young children, whose auditory centres of the brain are not yet fully developed, require better signal quality than adults to understand speech well. They don't have the language knowledge or life experience to 'fill in the blanks' when they don't hear a word or only hear part of it."[10]

These developmental barriers within young students' brains affect speech perception, attention, behavior, and overall classroom performance.

90% of Grade 1 students are not hearing all of their teachers' words.



[10] Speech Language and Audiology Canada http://sac-oac.ca/sac-work/classroom-acoustics

4 Classrooms may put special needs students at even greater risk

Classroom environments make learning difficult for all students, but students with special needs may find them particularly challenging.

Acoustical problems in schools exacerbate the learning difficulties for students:

- for whom the language of instruction is a second language
- who have learning disabilities
- who have a temporary or permanent hearing loss[11]

For example, children learning English as a second language find it harder to discriminatie words accurately when there is background noise.[12]

Students with a learning disability have a harder time tuning out typical classroom background noise and paying attention to what a teacher is saying.[13]

We also know that many students — particularly in at-risk populations — can have mild fluctuating hearing loss. One study found on any given day about 43% of primary-level children could fail a basic hearing test because of middle ear infections.[14]

On any given day about 43% of primary-level children could fail a basic hearing test because of middle ear infections.

[11] Berg, F.S. 1993 Acoustics and Sounds Systems in Schools

[12] (Crandell, C. (1994). Use of sound field amplification with ESL students. Presented at the American Academy of Audiology annual meeting. Richmond ,VA. and Crandell, C. (1996). Effects of sound field FM amplification on the speech perception of ESL children. Educational Audiology Monograph

[13] Children With Developmental Disabilities: The Effect of Sound Field Amplification on Word Identification

[14] Flexer, C., Wray, D, Ireland,J (1989) "Preferential Seating is Not Enough: Issues in Classroom Management of Hearing Impaired Students" Language, Speech, and Hearing Sciences in Schools, 20 11-21.

5 Acoustic treatments do nothing about the distance problem

Acoustic treatments are great, and if you've got the money, you should absolutely install them.

Absorbant panels, double-glazing, and insulation can help reduce noise and reverberation problems in classrooms. Unfortunately, they still can't address one of the biggest challenges to student comprehension: distance from the teacher.

Even in an acoustically-treated room, the teacher's voice will always be weaker for the students seated farthest away. This can result in an inadequate — or even negative — SNR that impacts comprehension and learning.

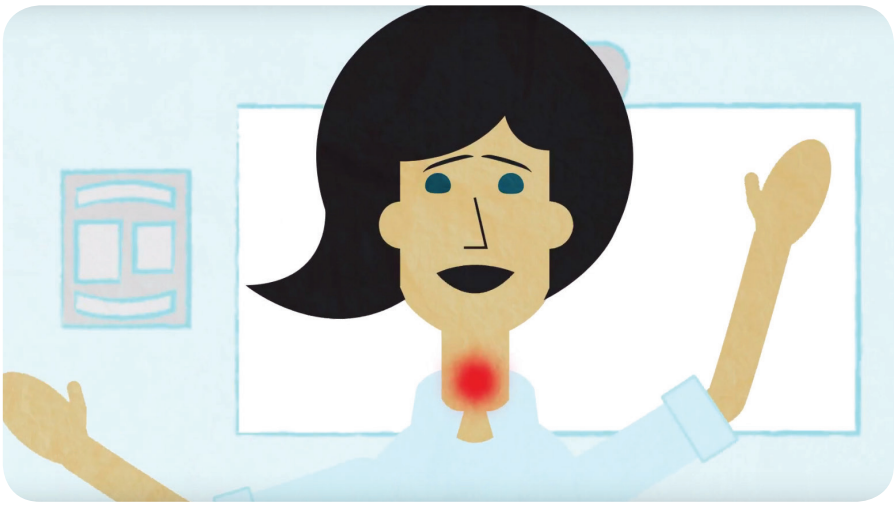
We know that students' word recognition scores decline the farther they sit from the teacher, dropping from 95% down to 60% only 24 feet (7 metres) away.[15]

So unless you have a very small class, in which students can all sit very close to the teacher, treatments alone are not enough.

[15] Palmer C. Hearing and listening in a typical classroom, From Language, Speech & Hearing Services in Schools, July 1997

6 Many teachers strain their voice to be heard — but it's not working

Physical classrooms don't just cause problems for students — teachers suffer as well.



Most teachers recognize that students in the back of the classroom will have a harder time hearing than students at the front. Although they don't usually have sound meters, they are intuitively trying to keep their voice louder than the background noise.

It's a losing effort though: teachers are rarely able to sustain the necessary 15dB advantage over noise all day.[16] Making the effort, however, comes at a real cost. Speaking in the "teacher voice" all day long results in hoarseness, laryngitis, and worse. The average teacher takes at least a sick day per year related to vocal strain, and teachers are 20 times more likely than other professionals to permanently damage their vocal mechanisms.[17]

There are other more subtle consequences of the traditional raised teacher voice. A raised voice boosts volume of vowel sounds, which provide the power but only about 30% of the meaning in speech. No amount of shouting can deliver the consonant sounds that provide the critical distinctions in meaning — think 'cap' versus 'cat'.[18] Just as important, a raised voice can create a negative emotional climate in the room that can make it harder to connect with some students.

[16] Crandell, C., & Smaldino, J. (1994). The importance of room acoustics. In R. Tyler & D. Schum (Eds.), Assistive listening devices for the hearing impaired (pp. 142–164). Baltimore, MD: Williams & Wilkins.

[17] Smith E, Gray SD, Dove H, Kirchner L, Heras H. Frequency and effects of teachers' voice problems. J Voice. 1997;11(1):81-87. &. Titze IR, Lemke J, Montequin D. Populations in the U.S. workforce who rely on voice as a primary tool of trade. NCVS Status and Progress Report. 1996;Nov(10):127-132.

[18] Crandell C. Speech recognition in noise by children with minimal degrees of sensorineural hearing loss. Ear Hear. 1993;14:201-216.

7 Classroom seating affects behavior — but maybe not for the reason you think

Many teachers use seating arrangements as a component of classroom management. A lot of energy can go into placing talkative or troublesome students where they'll be easiest to control — and many teachers may put these students at the front and center of the class because it's easier to keep an eye on them.

But "front and center" is also where it's easiest to hear in a typical classroom. The acoustical environment may have as much or more impact on student behavior than simply whether or not the teacher can see inattentive or disruptive students.

As we've seen in this guide, classrooms are generally challenging places to comprehend and focus, with the seats farthest from the teacher being dramatically worse for comprehension. Students in seats at the back and sides — especially those who may already have attention challenges — eventually tire of trying to pick out every word. They have difficulty staying on task, and find it harder to maintain discipline and cooperation.[21,22] Moving these students to the front certainly keeps them under watch, but it also dramatically reduces the energy required to comprehend and focus. Students become easier to manage because it's easier for the students to manage, too.

[21] Gawron VJ. Performance effects of noise intensity, psychological set, and task type and complexity. Human Factors. 1982;24(2):225-243.

[22] Cohen S, Evans GW, Krantz DS, Stokols DS. Physiological, motivational, and cognitive effects of aircraft noise on children — Moving from the laboratory to the field. Am Psychologist. 1980;35(3):231-243.

8 Technology overload is real, and your classroom probably isn't helping

The hardware and software tools teachers want — and are expected — to use can be a two-edged sword. They simultaneously free up time and consume it. And because the technology allows us to do so much more, it creates an environment in which we *must*.

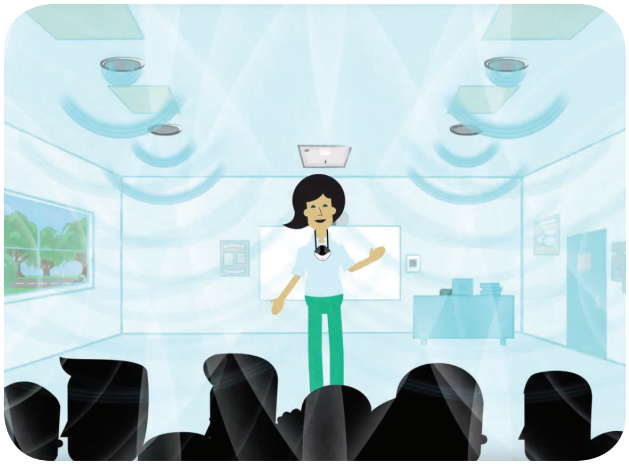
As organized and supportive as technologists are, the final success of technology integration is usually the job of teachers. And it's easy to get overwhelmed. Large-format monitors, projectors, interactive whiteboards, document cameras, speakers, teacher computers, mobile devices, media input connections, internet resources and collaboration tools, presentation software, management packages, probably a dusty television and DVD player, remote controls, and cables everywhere — it's a scene teachers a generation ago couldn't have imagined.

When just one lost remote control can throw off an entire teaching period, it's important to keep things as simple as possible and reduce the number of "moving parts."[23,24]

[23] Moulton J, Too Sweet and Juicy: Can There Really Be Too Much of a Good Thing with Tech?, Edutopia http://www.edutopia.org/technology-over-load. 2007.

[24] Tucker C, The Techy Teacher / Five Tips for Avoiding Technology Overload , The Working Lives of Educators . 2016. 73 (8): 89-90. http://www.ascd.org/publications/educational-leadership/may16/vol73/num08/Five-Tips-for-Avoiding-Technology-Overload.aspx

You can make your classroom a better place to learn



What can be done? Decades of research proves that the serious problems caused by poor classroom acoustics can be overcome with appropriate classroom sound technology.

By effectively bringing the teacher's voice closer to students using a microphone and speakers, classroom sound technology reduces the impact of noise, distance, and reverberation on learning.

These systems show excellent and consistent results for improving attention, comprehension, behavior, and academic outcomes for all students.

The benefits of classroom sound systems are significant:

- better ability to discriminate words and spoken language
- better standardized test scores in early literacy on the Developmental Reading Assessment and in reading fluency[24]
- increased student participation, confidence, and empowerment[25]

Teachers who use classroom sound systems also report reduced sick days and increased energy when using classroom sound technology.[26]

Some of these systems also incorporate time-saving tools — such as a wall panel for controlling all classroom AV technology, or automated lecture capture.

Classroom sound technology is a simple yet powerful way to transform a common classroom into a focused, clear space for learning.

If you would like a free consultation to learn if classroom sound technology is right for you, visit gofrontrow.com/contact-us.

[24] Chelius, L. (2004). Trost Amplification Study. Canby, Oregon: Canby School District. Unpublished manuscript.

[25] Rubin, R., Aquino-Russell, & Flagg-Williams (2007). Evaluating sound field amplification technology in New Brunswick Schools. Paper presented at the annual conference of the Canadian Association of Speech-Language Pathologists and Audiologists.

[26] Rosenberg, G., Blake-Rahtner, P., Heavner, J., Allen, L., Redmond, B., & Phillips (1999). Improving classroom acoustics (ICA): A three-year FM soundfield classroom amplification study. Journal of Educational Audiology; 7(3). 8-28.