

The Impact of Classroom Noise on English Language Learners

A 1994 study by Dr. Carl Crandel, Professor of Audiology at the University of Florida, reveals that ambient classroom noise negatively affects sentence recognition of English Language Learning (ELL) children significantly more than native English-speaking children.

The study reveals that with little or no classroom noise both native and non-native English speaking children achieve equivalent work recognition scores. However, as the voice-to-noise levels dropped below 6 decibels the non-native English speaking children's sentence recognition scores become significantly poorer than native English speaking children.

As the table to the left shows, at voice-to-noise ratios below +6 decibels, the ELL children are severely impacted in their ability to discern the key sounds (soft consonant sounds in particular) necessary for achieving adequate word recognition. ELL children seated more than 9 feet from a teacher will struggle to understand a significant portion of the information presented by their teacher.

In addition, quantitative measurements have revealed that average voice-to-noise levels in the elementary and secondary schools will range from +8 dB to -8 dB depending on where a child is seated relative to the teacher. This clearly means that ELL children will not be able to hear adequately in their classrooms and will be unable to achieve their potential without some type of intervention strategy. Classroom audio is an effective intervention strategy, improving word recognition of ELL children by 20 to 30%.

Comparison of ELL Children and Native English-speaking children at increased Classroom Noise Levels

Approximate Distance from teacher	3 ft.	6 ft.	12 ft.	15 ft.	18 ft.	24 ft.
Actual Voice-to-noise Level	+9 dB	+6 dB	+3 dB	0 dB	-3 dB	-6 dB
Native English Average Test Score	99%	97%	95%	93%	84%	67%
Non-Native English Avg. Test Score	98%	93%	89%	82%	62%	42%

Mean sentence recognition scores, percent correct, as a function of voice-to-noise ratio. Adapted from Crandel, C. (1994) "The Effects of Noise on the Speech of Non-Native English Children."

In a separate 1994 study, Dr. Crandel tested classroom audio technology as an intervention strategy for ELL children. The study showed that classroom audio technology significantly improved speech perception of non-native English speaking children. Crandel studies the amplified and unamplified speech recognition of ELL children at various speaker-listener distances. Pre-recorded monosyllabic word lists played unamplified through a KEMAR mannequin, then amplified with classroom audio technology.

As the table at the right shows, at distances beyond 12 feet from the teacher, classroom audio significantly improved word recognition for the ELL children. The 83% versus 79% score at 6 ft. may have been an anomaly due to playing the word lists through the mannequin. Also based on the previous study it is likely that a substantive disparity in scores would have probably started to occur around 9 feet from the teacher.

Noise measurement in occupied kindergarten classrooms can range from 65 to 75 decibels (dB), occupied elementary classrooms can range from 55 to 65 decibels. At these noise levels ELL children seated 9 feet or greater from their teacher will be substantially impaired in their ability to accurately perceive words and sentences spoken by their teacher. No matter what the noise level of a given classroom, classroom audio will provide a great benefit to word recognition of children learning English as a second language.

Comparison of Amplified & Unamplified Word Recognition of ELL Children at Various Distances from Teacher

Distance from Teacher	6 ft.	12 ft.	24 ft.
Amplified % Correct	79%	79%	77%
Unamplified % Correct	83%	58%	43%