

Professional Voice Use in High School Classrooms: Relationships Between Classroom Acoustics and Voice Parameters of Teachers at the Beginning and at the End of a School Year

Objective: To accurately determine changes in the voice use of teachers along a school year. Furthermore, the relationship between vocal parameters, classroom acoustics and noise is statistically investigated.

Methods: 37 teachers from two high schools in Torino (Italy) participated in this study at the beginning of a school year. 32 of them took part in the study also at the end of the same school year.

In each period teachers were monitored repeatedly, adopting the same procedure, using the Voice Care device, which consists in a contact microphone to be placed at the jugular notch connected to a data logger. Vocal acquisitions contained information on the voice-use for entire lessons, from which plenary lesson monitorings were extracted since they require the highest phonation load. Each teacher performed an interview before each monitoring to obtain a conversational speech level. Sound pressure level (SPL), fundamental frequency (F_0) and phonation time percentage ($D_t\%$) were evaluated to characterize the vocal behavior and fatigue under different lessons and periods. A perceptual assessment of voice was also performed to investigate changes in the vocal health of teachers along a school year.

Results: Voice parameters were analyzed in relation with the reverberation and noise conditions in which they were measured. Overall, it appeared that teachers adjust their voice significantly with the reverberation time both at the beginning and at the end of the school year, as well as with noise. Moreover, teachers who worked in worst acoustic conditions showed an increase in SPL at the end of the school year.

Conclusions: Classroom acoustics and noise significantly influence teachers' voice throughout an entire school year. To prevent from voice-related pathologies it is therefore important to solve acoustical issues as well as to determine a prevention program that easily allows monitoring the voice status of professionals in their workspaces.

Arianna Astolfi, PhD, Confirmed Associate Professor, Department of Energy, Politecnico di Torino, +390110904496, arianna.astolfi@polito.it

Giuseppina Emma Puglisi, MSc, PhD student, Department of Energy, Politecnico di Torino, +390110904545, giuseppina.puglisi@polito.it

Giulia Calosso, MSc, PhD student, Department of Management and Production Engineering, Politecnico di Torino, +390110904545, giulia.calosso@libero.it

Antonella Castellana, MSc, PhD student, Department of Electronics and Telecommunications, Politecnico di Torino, +390110904073, antonella.castellana@polito.it

Alessio Carullo, PhD, Confirmed Associate Professor, Department of Electronics and Telecommunications, Politecnico di Torino, +390110904202, alessio.carullo@polito.it