Empirical prediction of speech and noise levels in school classrooms

Murray Hodgson
Acoustics and Noise Research Group, University of British Columbia, SOEH-3rd Floor, 2006 East Mall, V6T 1Z3 Vancouver, BC, Canada, hodgson@mech.ubc.ca

The objective of the work reported here was to develop empirical models for predicting teacher speech levels and student activity noise levels in school classrooms. To achieve this, over fifty elementary- and secondary-school classrooms of varied constructions and surface finishes, and containing varying numbers of students in different grades, were studied. The unoccupied classrooms were characterized by their measured reverberation times and background-noise levels. In each classroom, recordings were made during one typical four-hour period of classes involving various classroom activities. Activities were divided into six categories. Teachers logged the classroom activities during the recording period. Recordings were digitized and analyzed by the SANDRA procedure, involving fitting normal-distribution curves to the histograms of the statistical frequency distribution of A-weighted total levels. This identified the separate speech and noise levels in each classroom during each individual activity period. Resulting levels, along with candidate predictors (reverberation time, ventilation noise level, classroom dimensions, grade, number of students, activity, etc.) were input to a statistical-analysis program. Multiple-regression techniques were used to identify statistically significant predictors, and develop an empirical model for predicting speech and noise levels.