

Table S1. The Acoustic and Subjective Analysis of the Investigation Protocol was implemented in the nine case study schools.

School	Investigated scenario	Investigation Protocol			
		Acoustic Measurements in Unoccupied Environments (Parameters)	Acoustic Measurements in Occupied Environments (Information)	Subjective Investigation Q1, Q2, Q3 (×= no questionnaires, ✓= administered questionnaires)	Vocal Effort (Teacher code: Subject of teaching)
K/F	S1	RT, C ₅₀ , D _{nT,w} (wall between the room and the corridor, wall between the room and adjacent classroom, floor between the room and the room below), L _{amb} , L _{Aeq} out of the room	Parameter: L _{Aeq} N. of students: 18	Q1: n/a ² Q3: ✓	FI1: - FI3: - FI4: - FI5: -
	S2	RT, C ₅₀ , D _{nT,w} (wall between the room and the corridor, wall between the room and adjacent classroom, floor between the room and the room below), L _{IC,int} , L _{amb} , L _{Aeq} out of the room	Parameter: L _{Aeq} N. of students: 6	Q2: n/a ² Q3: ✓	
	S3	RT, STI, D _{nT,w} (floor between the room and the room above), L _{IC,int} , L' _n (floor between the room and the room above)	n/a ¹	Q2: n/a ² Q3: ✓	
	S4	RT, L _{amb}	Parameter: L _{Aeq} N. of students: 11	Q2: n/a ² Q3: ✓	
	S5	RT, L _{amb}	Parameter: L _{Aeq} N. of students: 14	Q2: n/a ²	
	S6	RT	Parameter: L _{Aeq} N. of students: 40	Q2: n/a ²	
	S7	Outdoor L _{Aeq}	n/a ³	Q2: n/a ² Q3: ✓	
K/P	S1	RT, C ₅₀ , STI, D _{2m,nT,w} , D _{nT,w} (wall between the room and the corridor, wall between the room and adjacent classroom), L _{amb} , L _{Aeq} out of the room	Parameter: L _{Aeq} N. of students: 17	Q1: n/a ² Q3: ✓	PI1: - PI2: - PI3: - PI4: -
	S2	RT, C ₅₀ , STI, D _{2m,nT,w} , L _{amb} , L _{Aeq} out of the room	Parameter: L _{Aeq} N. of students: 17	Q2: n/a ² Q3: ✓	
	S3	n/a ¹	n/a ¹	Q2: n/a ² Q3: ✓	
	S4	n/a ¹	n/a ¹	Q2: n/a ² Q3: ✓	

School scenario (K=Kindergarten, P=Primary school, S=Secondary school) / City (F=Florence, P=Perugia, R=Rome)	Investigated scenario	Investigation Protocol			
	(S1=Classroom, S2=Laboratory, S3=Auditorium, S4=Gym, S5=Common area, S6=Canteen, S7=Outdoor area)	Acoustic Measurements in Unoccupied Environments (Parameters)	Acoustic Measurements in Occupied Environments (Information)	Subjective Investigation Q1, Q2, Q3 (×= no questionnaires, ✓= administered questionnaires)	Vocal Effort (Teacher code: Subject of teaching)
	S5	RT, L_{amb}	Parameter: L_{Aeq} N. of students: 18	Q2: n/a ²	
	S6	RT, $D_{2m,nT,w}$, L_{amb}	Parameter: L_{Aeq} N. of students: 30	Q2: n/a ²	
	S7	Outdoor L_{Aeq}	n/a ³	Q2: n/a ² Q3: ✓	
K/R	S1	RT, C_{50} , $D_{2m,nT,w}$, $D_{nT,w}$ (wall between the room and the corridor, wall between the room and adjacent classroom, floor between the room and the room below), L'_{nT} (floor between the room and the room above), $L_{IC,int}$, L_{Aeq} out of the room	n/a ¹	Q1: n/a ² Q3: ×	
	S2	RT, C_{50} , $D_{2m,nT,w}$, $D_{nT,w}$ (wall between the room and the corridor, wall between the room and adjacent classroom), L_{ID} , $L_{IC,int}$, L_{amb} , L_{Aeq} out of the room	n/a ¹	Q2: n/a ² Q3: ×	
	S3	n/a ¹	n/a ¹	Q2: n/a ² Q3: ×	
	S4	RT, $L_{IC,int}$	n/a ¹	Q2: n/a ² Q3: ×	
	S5	RT	n/a ¹	Q2: n/a ²	
	S6	RT	n/a ¹	Q2: n/a ²	
	S7	Outdoor L_{Aeq}	n/a ³	Q2: n/a ² Q3: ×	
P/F	S1	RT, C_{50} , $D_{2m,nT,w}$, $D_{nT,w}$ (wall between the room and the corridor, wall between the room and adjacent classroom), L'_{nT} (floor between the room and the room above), $L_{IC,int}$, L_{amb}	Parameter: L_{Aeq} N. of students: 24	Q1: ✓ Q3: ✓	FPI1: Italian FPM1: Mathematics FPM2: Mathematics
	S2	RT, C_{50} , $D_{nT,w}$ (floor between the room and the room above, floor between the room and the room below),	Parameter: L_{Aeq} N. of students: 20	Q2: ✓ Q3: ✓	

School (K=Kindergarten, P=Primary school, S=Secondary school) / City (F=Florence, P=Perugia, R=Rome)	Investigated scenario	Investigation Protocol			
	(S1=Classroom, S2=Laboratory, S3=Auditorium, S4=Gym, S5=Common area, S6=Canteen, S7=Outdoor area)	Acoustic Measurements in Unoccupied Environments (Parameters)	Acoustic Measurements in Occupied Environments (Information)	Subjective Investigation Q1, Q2, Q3 (×= no questionnaires, ✓= administered questionnaires)	Vocal Effort (Teacher code: Subject of teaching)
		L _{IC,int} , L _{Aeq} out of the room			
	S3	RT, STI, D _{nT,w} (floor between the room and the room above), L _{IC,int} , L' _n (floor between the room and the room above)	n/a ¹	Q2: ✓ Q3: ✓	
	S4	RT, L _{IC,int}	Parameter: L _{Aeq} N. of students: 20	Q2: ✓ Q3: ✓	PPF1: Physical education
	S5	RT, L _{amb} , L _{Aeq} out of the room	Parameter: L _{Aeq} N. of students: 15	Q2: ✓	
	S6	RT	Parameter: L _{Aeq} N. of students: 18	Q2: ✓	
	S7	Outdoor L _{Aeq}	n/a ³	Q2: ✓ Q3: ✓	
P/P	S1	RT, C ₅₀ , STI, D _{nT,w} (wall between the room and the corridor, wall between the room and adjacent classroom, floor between the room and the room below), L _{amb} , L _{Aeq} out of the room	Parameter: L _{Aeq} N. of students: 18	Q1: ✓ Q3: ✓	PP1: Italian PPM2: Mathematics
	S2	RT, C ₅₀ , STI, D _{nT,w} (wall between the room and the corridor, wall between the room and adjacent classroom, floor between the room and the room above), L' _n (floor between the room and the room above), L _{amb} , L _{Aeq} out of the room	Parameter: L _{Aeq} N. of students: 18	Q2: ✓ Q3: ✓	
	S3	RT, C ₅₀ , STI, D _{nT,w} (wall between the room and the corridor, wall between the room and adjacent classroom, floor between the room and the room below), L _{amb} , L _{Aeq} out of the room	Parameter: L _{Aeq} N. of students: 18	Q2: ✓ Q3: ✓	
	S4	RT, L _{IC,int}	Parameter: L _{Aeq} N. of students: 18	Q2: ✓ Q3: ✓	PPF3: Physical education PPF4: Physical education

School (K=Kindergarten, P=Primary school, S=Secondary school) / City (F=Florence, P=Perugia, R=Rome)	Investigated scenario	Investigation Protocol			
	(S1=Classroom, S2=Laboratory, S3=Auditorium, S4=Gym, S5=Common area, S6=Canteen, S7=Outdoor area)	Acoustic Measurements in Unoccupied Environments (Parameters)	Acoustic Measurements in Occupied Environments (Information)	Subjective Investigation Q1, Q2, Q3 (×= no questionnaires, ✓= administered questionnaires)	Vocal Effort (Teacher code: Subject of teaching)
	S5	RT, L_{amb}	Parameter: L_{Aeq} N. of students: 3	Q2: ✓	
	S6	n/a ¹	n/a ¹	Q2: ✓	
	S7	Outdoor L_{Aeq}	n/a ³	Q2: ✓ Q3: ✓	
P/R	S1	RT, C_{50} , $D_{nT,w}$ (wall between the room and the corridor, wall between the room and adjacent classroom, floor between the room and the room below), L'_n (floor between the room and the room above), $L_{iC,int}$, L_{amb} , L_{Aeq} out of the room	Parameter: L_{Aeq} N. of students: 20	Q1: ✓ Q3: ✓	RPI1: Italian RPM2: Mathematics RPS5: Educational support
	S2	n/a ¹	n/a ¹	Q2: ✓ Q3: ✓	
	S3	n/a ¹	n/a ¹	Q2: ✓ Q3: ✓	
	S4	RT, $L_{iC,int}$	n/a ¹	Q2: ✓ Q3: ✓	RPF3: Physical education RPF4: Physical education
	S5	RT, L_{Aeq} out of the room	Parameter: L_{Aeq} N. of students: 13	Q2: ✓	
	S6	n/a ¹	n/a ¹	Q2: ✓	
	S7	Outdoor L_{Aeq}	n/a ³	Q2: ✓ Q3: ✓	
S/F	S1	RT, C_{50} , $D_{nT,w}$ (wall between the room and the corridor, wall between the room and adjacent classroom, floor between the room and the room above), L'_n (floor between the room and the room above), $L_{iC,int}$, L_{amb} , L_{Aeq} out of the room	Parameter: L_{Aeq} N. of students: 14	Q1: ✓ Q3: ✓	FSI1: Italian FSM1: Mathematics
	S2	RT, C_{50} , $D_{nT,w}$ (wall between the room and the corridor, wall between the room and adjacent classroom), $L_{iC,int}$, L_{amb}	Parameter: L_{Aeq} N. of students: 24	Q2: ✓ Q3: ✓	
	S3	RT, STI, $D_{nT,w}$ (floor between the room and the room above), L'_n (floor between the	Parameter: L_{Aeq} N. of students: 32	Q2: ✓ Q3: ✓	

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	(S1=Classroom, S2=Laboratory, S3=Auditorium, S4=Gym, S5=Common area, S6=Canteen, S7=Outdoor area)	Acoustic Measurements in Unoccupied Environments (Parameters)	Acoustic Measurements in Occupied Environments (Information)	Subjective Investigation Q1, Q2, Q3 (×= no questionnaires, ✓= administered questionnaires)	Vocal Effort (Teacher code: Subject of teaching)
	room and the room above), $L_{iC,int}$, L_{amb} , L_{Aeq} out of the room				
	S4 RT, $L_{iC,int}$	Parameter: L_{Aeq} N. of students: 21	Q2: ✓ Q3: ✓	FSF1: Physical education FSF2: Physical education	
	S5 RT, L_{amb}	n/a ¹	Q2: ✓		
	S6 RT	Parameter: L_{Aeq} N. of students: 64	Q2: ✓		
	S7 Outdoor L_{Aeq}	n/a ³	Q2: ✓ Q3: ✓		
S/P	S1 RT, STI, C_{50} , $D_{nT,w}$ (wall between the room and the corridor, wall between the room and adjacent classroom, floor between the room and the room below), L_{amb} , L_{Aeq} out of the room	Parameter: L_{Aeq} N. of students: 10	Q1: ✓ Q3: ✓	PSI1: Italian PSM2: Mathematics	
	S2 RT, STI, C_{50} , $D_{nT,w}$ (wall between the room and the corridor, wall between the room and adjacent classroom, floor between the room and the room above), L'_{n} (floor between the room and the room above), L_{amb} , L_{Aeq} out of the room	Parameter: L_{Aeq} N. of students: 10	Q2: ✓ Q3: ✓		
	S3 RT, STI, C_{50} , $D_{nT,w}$ (wall between the room and the corridor, floor between the room and the room above), L'_{n} (floor between the room and the room above), L_{amb} , L_{Aeq} out of the room	n/a ¹	Q2: ✓ Q3: ✓		
	S4 RT, L_{amb}	Parameter: L_{Aeq} N. of students: 21	Q2: ✓ Q3: ✓	PSF3: Physical education PSF4: Physical education	
	S5 RT, L_{amb}	Parameter: L_{Aeq} N. of students: 3	Q2: ✓		
	S6 n/a ¹	n/a ¹	Q2: ✓		
	S7 Outdoor L_{Aeq}	n/a ³	Q2: ✓		

School scenario (K=Kindergarten, P=Primary school, S=Secondary school) / City (F=Florence, P=Perugia, R=Rome)	Investigated scenario	Investigation Protocol			
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				Q3: √	
	S1	RT, C ₅₀ , D _{nT,w} (wall between the room and adjacent classroom, floor between the room and the room above), L' _n (floor between the room and the room above), L _{iC,int} , L _{iD} , L _{amb} , L _{Aeq} out of the room	n/a ¹	Q1: × Q3: ×	
S/R	S2	RT, C ₅₀ , D _{nT,w} (wall between the room and adjacent classroom, floor between the room and the room above), L _{amb} , L _{Aeq} out of the room	n/a ¹	Q2: × Q3: ×	
	S3	n/a ¹	n/a ¹	Q2: × Q3: ×	
	S4	RT, L _{iC,int}	n/a ¹	Q2: × Q3: ×	
	S5	RT	n/a ¹	Q2: ×	
	S6	n/a ¹	n/a ¹	Q2: ×	
	S7	n/a ¹	n/a ³	Q2: × Q3: ×	

¹ This space has not been investigated (reasons: not existing in the school, not accessible or not used).

² Not applicable for children of kindergarten.

³ Not pertinent for outdoor environments

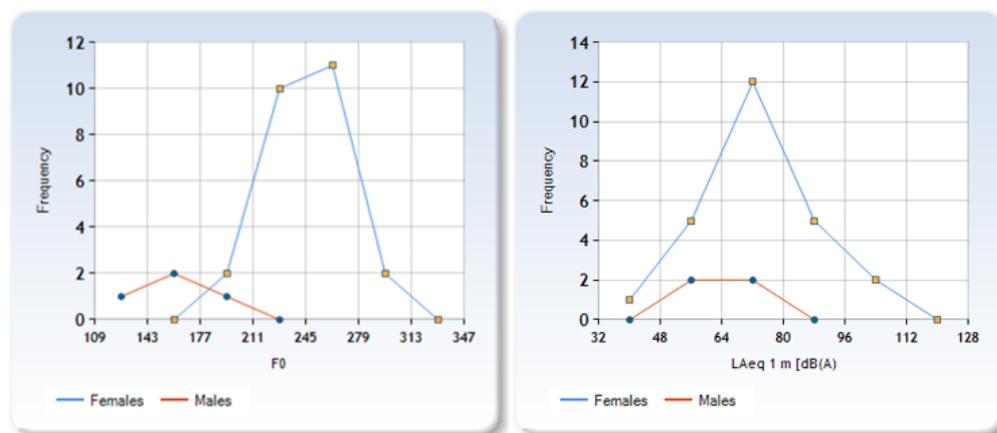


Figure S1. A histogram showing how the fundamental frequency is distributed (on the left). A histogram showing the distribution of the levels of the acoustic signal (SPL) emitted by the speaker at 1 m (vocal effort) (on the right).

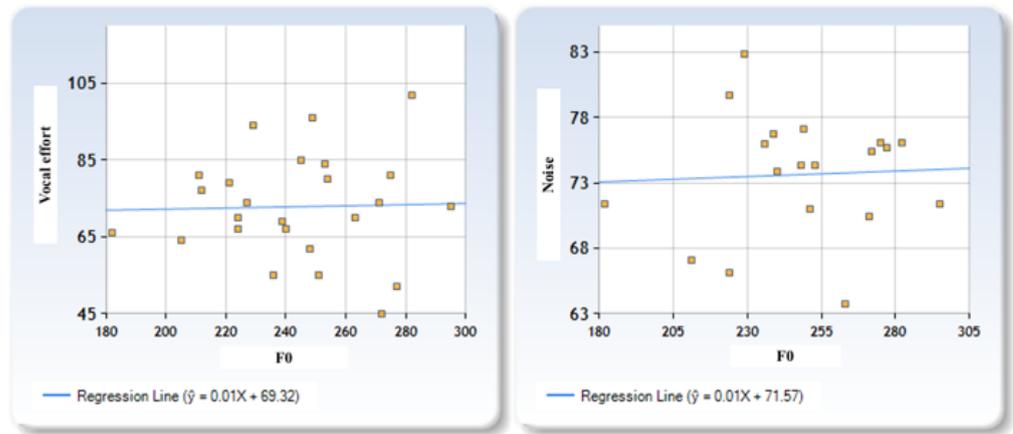


Figure S2. Scatter plots represent the linear regression between two variables. The relationship between F0 and Vocal Effort (on the left): linear regression $x = \text{F0 [Hz]}$, $y = \text{SPL voice [dB(A)]}$; $r = 0.03$, $p = 0.89$. The relationship between F0 and Noise (on the right): linear regression $x = \text{F0 [Hz]}$, $y = \text{SPL noise [dB(A)]}$; $r = 0.05$, $p = 0.84$.

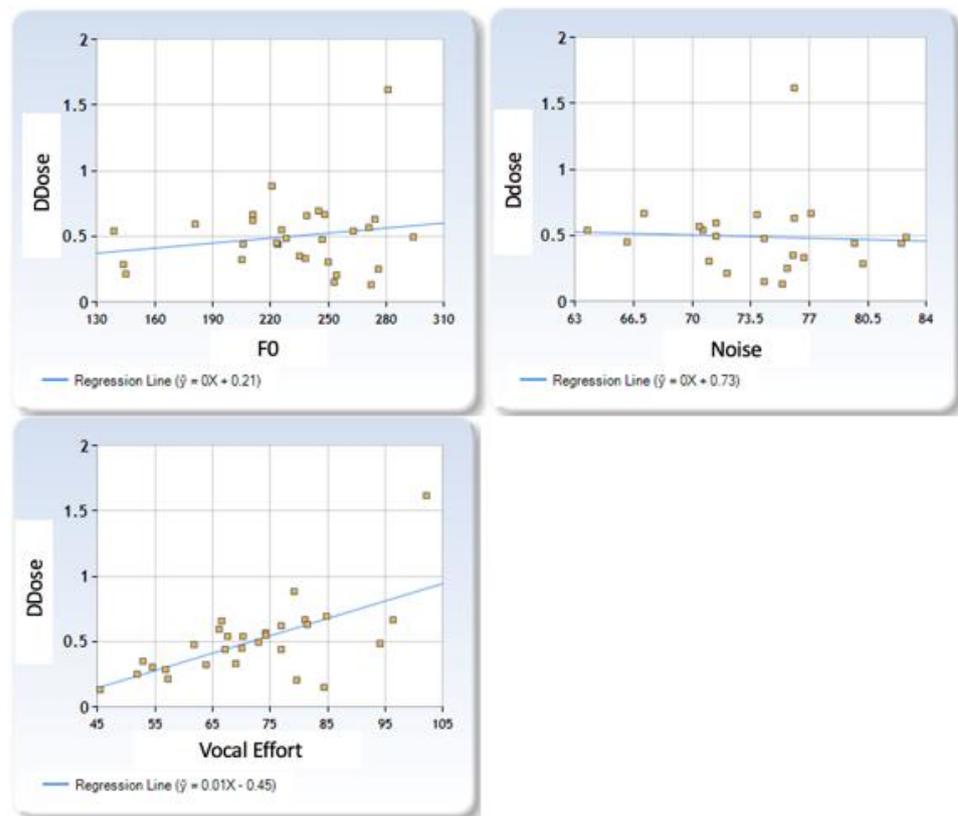


Figure S3. Scatter plots represent the linear regression between two variables. The relationship between F0 and DDose (top left): linear regression $x = \text{F0 [Hz]}$, $y = \text{DDose [m/s]}$; $r = 0.05$, $p = 0.81$. The relationship between Noise and DDose (top right): linear regression $x = \text{SPL noise [dB(A)]}$, $y = \text{DDose [m/s]}$; $r = -0.01$, $p = 0.97$. The relationship between Vocal effort and DDose (bottom left): linear regression $x = \text{SPL voice [dB(A)]}$, $y = \text{DDose [m/s]}$; $r = 0.62$, $p = 0.001$.