

Indoor Environmental Quality Evaluation of Lecture Classrooms in an Institutional Building in a Cold Climate

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Supplementary Material

Table S1. Spearman rank correlation coefficients of key IEQ parameters (n = 99).

Table S2. Multivariate analysis.

Table S3. Relative error and R^2 for the optimal ANN model by ten consecutive trainings.

Table S1. Spearman rank correlation coefficients of key IEQ parameters (n = 99).

	Total people	Vol	Outdoor temp	Outdoor RH	Indoor temp	Indoor RH	Indoor CO ₂	ACR	Indoor sound	Indoor pressure	Indoor light
Total people	1										
Volume	-0.294	1									
Outdoor temp	0.005	0.082	1								
Outdoor RH	0.474	-0.314	-0.188	1							
Indoor temp	0.403	-0.435	-0.298	0.165	1						
Indoor RH	0.033	0.243	0.336	0.276	-0.560	1					
Indoor CO ₂	-0.045	0.173	-0.461	0.109	0.002	-0.057	1				
ACR	0.634	-0.356	0.356	0.202	0.232	-0.040	-0.740	1			
Indoor sound	0.458	-0.348	0.053	0.262	0.313	-0.085	-0.123	0.402	1		
Indoor pressure	-0.188	0.234	-0.296	-0.279	0.030	-0.155	0.007	-0.142	-0.145	1	
Indoor light	-0.284	-0.030	-0.259	-0.329	0.283	-0.506	0.026	-0.256	-0.133	0.228	1

Bold values are statistically significant ($p < 0.05$). ACR is the air change rate, measured over the lecture.

Table S2. Multivariate analysis

	Effect	Significance	Dependent Variables	Significance
Outdoor temperature	Pillai's Trace	0.000	Indoor temperature	0.104
	Wilks' Lambda	0.000	Indoor RH	0.000
	Hotelling's Trace	0.000	Indoor CO ₂	0.002
	Roy's Largest Root	0.000		
Outdoor RH	Pillai's Trace	0.000	Indoor temperature	0.415
	Wilks' Lambda	0.000	Indoor RH	0.001
	Hotelling's Trace	0.000	Indoor CO ₂	0.763
	Roy's Largest Root	0.000		
Indoor light	Pillai's Trace	0.012	Indoor temperature	0.007
	Wilks' Lambda	0.012	Indoor RH	0.002
	Hotelling's Trace	0.012	Indoor CO ₂	0.865
	Roy's Largest Root	0.012		
ACR	Pillai's Trace	0.000	Indoor temperature	0.199
	Wilks' Lambda	0.000	Indoor RH	0.081
	Hotelling's Trace	0.000	Indoor CO ₂	0.000
	Roy's Largest Root	0.000		
Indoor sound	Pillai's Trace	0.257	Indoor temperature	0.085
	Wilks' Lambda	0.257	Indoor RH	0.060
	Hotelling's Trace	0.257	Indoor CO ₂	0.822
	Roy's Largest Root	0.257		

Bold values are statistically significant ($p < 0.05$). ACR is the air change rate, measured over the lecture.

Table S3. Relative error and R² for the ANN model by ten consecutive trainings.

Participation (%)	Relative error (mean±sd, %)			
	Indoor temperature	Indoor RH	Indoor CO ₂	
Training	60.4±6.2	44.2±21.4	32.2±9.5	7.2±3.0
Testing	22.0±5.7	70.4±18.5	53.6±17.7	11.4±5.3
Holdout	17.6±1.5	73.8±21.7	65.0±13.3	14.8±6.8
Total	R ² (mean±sd) for the measured and predicted value			
	Indoor temperature	Indoor RH	Indoor CO ₂	
	0.469±0.137	0.624±0.057	0.928±0.029	