

Quantifying the Influence of Window-to-Wall Ratio (WWR) on Indoor Air Quality and Thermal Comfort: Classroom Study in Hot Arid Climates

Mai Mostafa Hassieb^{1*}, Ayman Ragab², Abdelaziz Farouk Mohamed³

¹Architectural Engineering & Environmental Design Department, Arab Academy for Science, Technology and Maritime Transport, Aswan 81511, Egypt.

²Department of Architectural Engineering, Faculty of Engineering, Aswan University, Aswan 81542, Egypt.

³Architectural Engineering & Environmental Design Department, Arab Academy for Science, Technology and Maritime Transport, Cairo 2033, Egypt.

*Correspondence: Mai Mostafa Hassieb, maihassieb@aast.edu

Abstract. Effective natural ventilation through well-designed windows plays a pivotal role in creating a healthy classroom environment, impacting students positively by ensuring fresh air, minimizing indoor pollutants, and maintaining comfortable temperatures. This study, conducted in educational buildings in Aswan, Egypt, investigates the influence of Window-to-Wall Ratio (WWR) on indoor air quality and thermal comfort. Utilizing the HOBO MX CO₂ data logger and Design Builder simulation program, two models with WWRs of 20% and 30% were assessed. Results highlight the superiority of a 20% WWR, emphasizing the need to open windows for at least 60 minutes in the summer to achieve improved air quality and thermal comfort. The proposed enhancements, based on the findings, offer valuable insights into educational buildings in hot, arid regions.

