



UNIVERSITI
TEKNOLOGI
MARA

College of
Built Environment

Poster Book

IIIDBEE X 2023
20 JANUARY 2023
*International Invention, Innovation & Design Exposition
for Built Environment and Engineering 2023*

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Evaluating the Thermal Environment in a Naturally Ventilated High-Rise Residential College Building

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INTRODUCTION

In student hostels, thermal comfort is important because it can impact students' comfort, health, learning, and overall quality of life. To achieve thermal comfort in free-running buildings, it is important to consider factors such as the climate-responsive envelope, ventilation, and behavioral controls.

ISSUES/ PROBLEM STATEMENT

One problem with natural ventilation in buildings is that it relies on natural forces, such as wind and buoyancy, to move air through the space. This means that the effectiveness of natural ventilation can be unpredictable and may not always provide sufficient airflow to maintain comfortable temperatures.

OBJECTIVES

This research aims to investigate the thermal environmental ranges for students in residential college universities in Malaysia, study case in high-rise building at Universiti Teknologi MARA, Shah Alam.

METHODOLOGY

There are four parameters in this study that influence thermal comfort: room air temperature, humidity, air velocity, and mean radiant temperature. These parameters were measured using the thermal microclimate HD32.3TC and HD32.3 instruments. The instruments were placed in the center of the hostel room at a height of 1.1 m from the floor and were used to record data for 48 hours in each hostel room.

FINDINGS

The data showed that the air and radiant temperatures in each room were lower on higher floors, with air temperatures of 29.6 °C, 29.1 °C, and 28.4 °C and radiant temperatures of 29.5 °C, 28.9 °C, and 28.3 °C respectively. The relative humidity data showed a correlation with the level of the building, with higher values on the upper floors. There was no significant difference in air speed between the rooms. These findings suggest that there is a difference in surface temperature of more than 2°C between the lower and upper floors.

NOVELTY

This research aims to broaden the understanding of thermal comfort in residential buildings on campus by investigating the comfort temperature of university students in Malaysia. This study will be helpful in improving occupants' learning performance by providing a comfortable and healthy microclimate, which is especially essential for residential buildings on campus in Malaysia.

CONCLUSION

The study found that several environmental parameters, including air temperature, relative humidity, air velocity, and mean radiant temperature, can affect thermal comfort, and should be properly controlled to provide a comfortable living environment for students. The data showed that the level floor of the high-rise building influences the indoor thermal environment.

COMMERCIALIZATION

This study can be commercialized by selling the research to the institution as a reference for where they can make improvements or conduct further research on thermal comfort in residential college universities.

RECOGNITIONS

Kolej Kediaman Mawar Universiti Teknologi MARA, Faculty of Applied Sciences (FSG), Faculty of Architecture, Planning and Surveying (FSPU).

CONFERENCES & PUBLICATION

Galeri Kolej Alam Bina, Kampus Puncak Alam, UiTM Cawangan Selangor.

Environmental Parameters		Air Temperature (°C)	Relative Humidity (%)	Air Speed (m/s)	Radiant Temperature (°C)	
Ground level	Room 1	Mean	29.6	68.9	0.16	29.5
		Standard Deviation	0.3	2.8	0.04	0.3
		Range	29 – 30.2	62.2 – 73.3	0 – 0.31	28.9 – 30.1
Level 6	Room 2	Mean	29.1	72.1	0.05	28.9
		Standard Deviation	0.3	2.8	0.03	0.3
		Range	28.5 – 29.7	64.6 – 76.6	0 – 0.18	28.3 – 29.5
Level 9	Room 3	Mean	28.4	73.5	0.10	28.3
		Standard Deviation	0.5	2.5	0.05	0.4
		Range	27.4 – 29.5	67.7 – 78.8	0 – 0.28	27.3 – 29.5

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