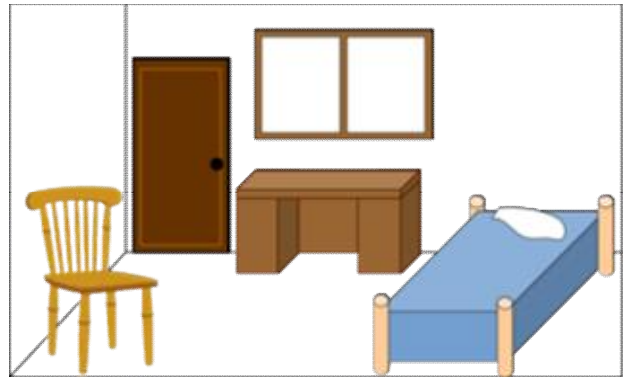


Mini-project: Sustainability and Indoor Environmental Quality of Bedrooms

Did you sleep well last night? Do you know the design and indoor environment of bedrooms will influence our health and well-being? What are the important factors affecting the sustainability and indoor environmental quality of bedrooms?



Like it or not, sleep is an essential part of our lives and we spend about one third of our life time in sleeping which mainly takes place in bedrooms. Sleeping is an essential self-healing potion that revitalizes our bodies and minds, but the issues determining the quality of sleeping is still a big mystery for many of us. Your bedroom environment is part of the sleep equation. It is interesting and important to investigate the environment of bedrooms and their impacts on the occupants.

Objectives

- To investigate the important factors affecting the sustainability and indoor environmental quality of bedrooms.
- To evaluate the practical issues and criteria for assessing sustainability and designing good quality environment in bedrooms.

Methodology

Students shall form a research team of 4-5 persons to carry out the investigation in bedroom(s) inside a real building. They may choose any building space that they find interesting and have proper access to. By applying the relevant theories and using personal observations and scientific measurements, they shall collect data and information to evaluate the characteristics of the bedroom environment and assess the key factors affecting its sustainability and indoor environmental quality.

Measurement of the environmental parameters (such as air temperature, relative humidity, carbon dioxide concentration level, air velocity and sound level) might be carried out using the data logger, anemometer, sound level meter and other related instruments borrowed from the laboratory. Students should pay attention to protect the instruments and avoid any damages. Examples of the instruments are shown below.

- HOBO Bluetooth Low Energy Carbon Dioxide - Temp - RH Data Logger MX1102
 - Further information: <http://www.onsetcomp.com/co2>
 - Free HOBOMobile app (from App Store or Google play) to control the data logger
- Hot wire anemometer (for measuring air velocity)
- LUTRON digital light meter LX-1108
- Integrating sound level meter



HOBO Data Logger MX1102



Integrating sound level meter



LUTRON digital light meter LX-1108



Hot wire anemometer

Results and Findings

This mini project will give them an opportunity to strengthen what they have learned during the lectures, by investigating the related topics further and relating the learning to practical situations. The purpose of the mini project is to help students to practice their skills in solving sustainability and indoor environmental quality problems, and also in communicating results to others. Therefore, it is important the students should clearly present the work (restate the objective of the problem, identify physical information, assumptions, sources used in the solution, and always include a discussion section on the results and their significance).

Each student group should carry out independent study and investigation in the bedroom(s) that they have identified. The results could include background theory, science-based facts, forensic evidence, data and information from the field measurements, evaluation of the findings by comparing with scientific criteria and standards.

After the investigation, the following information should be established to report the findings.

- (a) Description of the bedroom, its environment and related information
- (b) Background theory and issues identified for the study
- (c) Clear presentation of the measurement data and assessment
- (d) Analysis of the important factors affecting the sustainability and indoor environmental quality of bedrooms
- (e) Discussion of the practical issues and criteria for assessing sustainability and designing good quality environment in bedrooms

Students should develop a technical report describing their motivation, literature review, methods, and results, and then summarize their findings with a classroom oral presentation at the end of the semester (on 24 Apr 2017).

Project Report

Each student group should prepare their own report based on the data and information obtained during the investigation. Students should generate information to show their understanding and original thinking. Students making direct copy of the information in other's report (plagiarism), if found, will be disqualified.

The report should be neat and properly formatted and organized. The report shall not exceed twenty (20) A4 pages (including report body and appendices). Proper credit and referencing should be provided to the information sources. The mini project report in electronic PDF format shall be submitted via Moodle. Late submission will receive reduction in marks.

Report submission (via Moodle): **before 24 Apr 2017 (Mon)**

References

- ASHRAE, 2009. *Indoor Air Quality Guide: Best Practices for Design, Construction and Commissioning*, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Atlanta, GA.
- Auliciems, A. and Szokolay, S. V., 2002. *Thermal Comfort*, 2nd ed., Research, Consulting and Communications, Kangaroo Valley, NSW.
[<http://plea-arch.org/wp-content/uploads/PLEA-NOTE-3-THERMAL-COMFORT.pdf>]
- CIBSE, 2011. *Indoor Air Quality and Ventilation*, Knowledge Series KS17, Chartered Institution of Building Services Engineers (CIBSE), London.
- Edwards, B., 2014. *Rough Guide to Sustainability: A Design Primer*, 4th ed., RIBA, London.
- Indoor Air Quality Handbook: A Practical Guide to Indoor Air Quality Investigations (TSI) http://www.tsi.com/uploadedFiles/Site_Root/Products/Literature/Handbooks/IAQ_Handbook_2011_US_2980187-web.pdf

Web Links

Indoor Air Quality Information Centre <http://www.iaq.gov.hk/>
Indoor environmental quality (CDC) <http://www.cdc.gov/niosh/topics/indoorenv/>
Teaching Kit: Sustainable Design for Buildings (ArchSD) <http://www.archsd.gov.hk/archsd/html/teachingkits/tk1/>