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MODULE
15

Indoor Environment: Air Quality

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Indoor air quality (IAQ) is crucial for the health, comfort, and academic performance of students and staff in school buildings. Poor IAQ can lead to health issues such as respiratory ailments, allergies, and cognitive impairments, which can hinder learning. The World Health Organization (WHO) has identified indoor air pollution as one of the leading environmental risks to health, particularly in vulnerable populations like children.

Learning Objectives

- Green school buildings are dynamic learning environments.
- Operations and Maintenance for Whole School Sustainability
- Meaningful, purposeful, and engaging learning
- Sustainable Grounds & Transportation
- **Indoor Environment—Air Quality**
- Smart Cleaning & Integrative Pest Management
- Indoor Environment—Acoustics
- Water Efficiency and Quality
- Energy Efficiency—Lighting
- Plug Loads & HVAC Systems
- Materials and Resources
- Innovation & Conclusion
- Summary and Resources / GCP Quiz

INDOOR AIR QUALITY

- Indoor air quality (IAQ) is crucial for students' health, comfort, and academic performance.
- Poor IAQ can lead to respiratory ailments, allergies, and cognitive impairments.
- WHO identifies indoor air pollution as a leading environmental risk, especially in vulnerable populations.
- Factors contributing to IAQ include ventilation, indoor pollutants, building materials and furnishings, humidity and temperature, and occupant activities.
- Adequate ventilation dilutes indoor pollutants and replenishes indoor air with fresh outdoor air.
- Building materials and furnishings can release chemicals and particulates, causing poor IAQ.
- Improving IAQ can be achieved through enhanced ventilation, source control, regular maintenance, education, awareness, and monitoring systems.
- As schools adapt to changing conditions and public health awareness, prioritizing air quality will remain essential in educational infrastructure and policy.

AIR QUALITY IN SCHOOL BUILDINGS



- Importance of Indoor Air Quality (IAQ): IAQ is crucial for occupant health and productivity, especially in school buildings where children are vulnerable.
- Common Pollutants: Volatile Organic Compounds (VOCs), Particulate Matter (PM), Carbon Dioxide (CO₂), and Biological Contaminants can compromise IAQ.
- Strategies for IAQ Improvement: Proper ventilation, air filtering, source control, and regular maintenance are essential.
- Research shows a direct correlation between IAQ and student performance, with improved ventilation systems resulting in a 10% increase in test scores.

INDOOR ENVIRONMENT: AIR QUALITY IN SCHOOL BUILDINGS

- Indoor air quality (IAQ) is crucial for the health, comfort, and academic performance of students and staff.
- Poor IAQ can lead to health issues such as respiratory ailments, allergies, and cognitive impairments.
- The World Health Organization (WHO) has identified indoor air pollution as one of the leading environmental risks to health, especially in vulnerable populations.



DETERMINANTS OF INDOOR AIR QUALITY



- Ventilation: Adequate ventilation is crucial for diluting indoor pollutants and replenishing indoor air with fresh outdoor air.
- Indoor Pollutants: Common indoor air pollutants include volatile organic compounds (VOCs), particulate matter (PM), mold, and allergens.
- Building Materials and Furnishings: Materials used in construction and furnishings can release chemicals and particulates into the air.
- Humidity and Temperature: Maintaining an indoor relative humidity (RH) level of between 30% and 50% is ideal for comfort and health.
- Occupant Activities: Activities performed within the school can influence air quality.

MEASUREMENT OF INDOOR AIR QUALITY

- Direct Measurement: Using instruments to measure specific pollutants.
- Air Quality Index (AQI): Summarizing air quality data for informed decisions.
- Surveys and Questionnaires: Gathering subjective data from occupants regarding their perceptions of air quality and any health symptoms they may experience.



STRATEGIES FOR IMPROVING INDOOR AIR QUALITY



- Enhanced Ventilation: Utilizing mechanical ventilation systems or natural ventilation methods can significantly improve IAQ.
- Source Control: Identifying and reducing sources of indoor pollution is vital.
- Regular Maintenance: Regular servicing of HVAC systems ensures efficient and effective removal of airborne contaminants.
- Education and Awareness: Training staff and students on the importance of maintaining good air quality can foster a culture of awareness.
- Monitoring Systems: Implementing continuous air quality monitoring systems can provide real-time feedback and allow for prompt responses to deteriorating air quality conditions.

INDOOR ENVIRONMENTAL QUALITY IN EDUCATIONAL SETTINGS

- IEQ encompasses factors affecting comfort and health, especially in educational settings.
- Air quality is crucial as it affects cognitive function, productivity, and well-being of students and educators.

Understanding HVAC System

- HVAC system is integral to managing air quality in classrooms.
- Air Inflow and Outflow:
 - Air enters classroom primarily through supply air vents.
 - Air exits through return air vents.
 - Regular monitoring for dust accumulation on these vents is vital.





INDOOR ENVIRONMENTAL QUALITY IN EDUCATIONAL SETTINGS +

CO2 Monitoring

- Indoor CO2 levels can significantly exceed outdoor levels, potentially leading to cognitive impairments and reduced alertness.
- Regular monitoring can help ensure that air quality remains within acceptable limits.



Thermostat Functionality

- Classroom thermostats may allow for limited temperature adjustments, often within a ± 2 degrees Fahrenheit range.

Identifying Supply and Return Air Vents

- Supply Air Vents deliver conditioned air to the room.
- Return Air Vents draw air out of the room.

Maintaining Additional Ventilation Devices

- Other ventilation devices like fume hoods and local exhaust fans play critical roles in maintaining air quality.

Guidelines for Opening Windows

- Open windows can reduce CO2 levels, eliminate odors, and regulate indoor temperatures.
- Close windows can introduce allergens and pollutants, regulate outdoor temperatures, and disrupt classroom activities.

Best Practices for Window Management

- Install screens to keep insects at bay while allowing airflow.
- Ensure cross-ventilation and consider HVAC functionality before relying solely on open windows for ventilation.



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