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ONLINE TRAINING BY KRISHNAJI PAWAR

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MODULE
17

Indoor Environment: Acoustics

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Acoustics is a critical aspect of educational design, particularly in green schools that prioritize sustainability and student well-being. Excessive background noise can hinder learning, reduce concentration, and increase stress levels. Research shows that children exposed to high noise levels perform worse on reading comprehension tests.

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

INTRODUCTION

- Acoustics is crucial in green schools, promoting sustainability and student well-being.
- Excessive background noise can hinder learning, reduce concentration, and increase stress.
- Sound propagation is essential for designing spaces that minimize disruptive noise.
- Soft materials absorb sound, reducing noise levels, while hard surfaces reflect sound, increasing overall noise.
- Green schools often incorporate large, open spaces and natural materials, leading to specific acoustic challenges.
- Strategies for acoustic improvement include material selection, spatial design, acoustic treatment, and outdoor acoustic design.
- Sustainable materials like cork flooring and recycled acoustic ceiling tiles are used to reduce noise.
- Spatial design minimizes noise distractions by creating smaller, more defined learning spaces.
- Outdoor acoustic design uses vegetation as natural sound barriers, reducing noise pollution.
- Understanding acoustics and implementing effective design strategies can enhance communication, reduce distractions, and improve student outcomes.



ACOUSTICS IN GREEN SCHOOLS: IMPORTANCE AND STRATEGIES

- Acoustics is crucial in the design and functionality of educational spaces, especially in green schools.
- High noise levels can hinder learning, reduce concentration, and increase stress levels.



Acoustic Principles

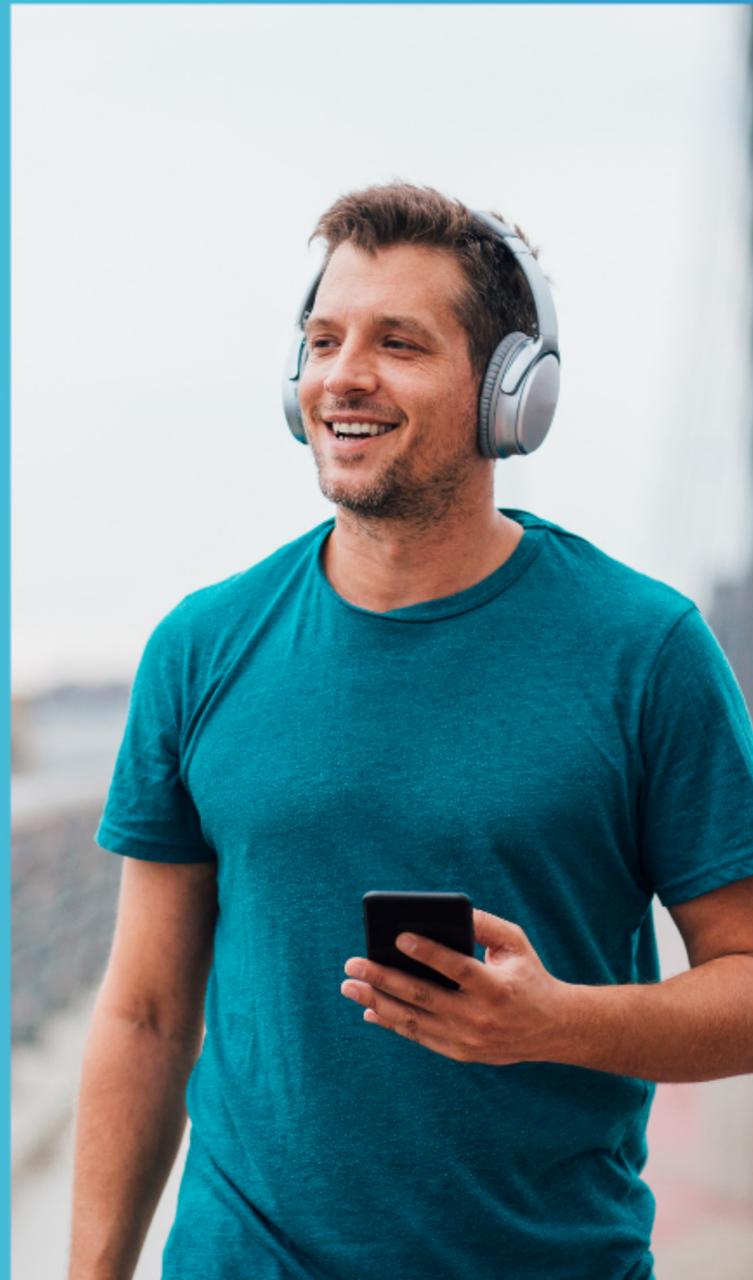
- Sound Propagation: Sound travels in waves and can be affected by factors like the medium, obstacles, and space geometry.
- Reverberation: Excessive reverberation can lead to unclear speech and difficulty in auditory processing.
- Sound Absorption and Transmission: Materials used in a space can either absorb or reflect sound.

ACOUSTIC CHALLENGES IN SCHOOLS

- Noise from External Sources: Schools near busy roads or industrial areas may experience high levels of external noise.
- Classroom Layout: Open-plan classrooms can lead to increased noise levels due to sound transmission.
- Equipment Noise: Excessive noise from HVAC systems, computers, and other mechanical equipment can lead to increased stress levels among teachers.



STRATEGIES FOR ACOUSTIC IMPROVEMENT IN GREEN SCHOOLS



- Material Selection: Choose sustainable materials that also provide sound absorption.
- Spatial Design: Consider classroom layout to minimize noise distractions.
- Acoustic Treatment: Use of wall panels, ceiling clouds, and sound barriers to enhance sound quality.
- Outdoor Acoustic Design: Consider the acoustic environment with strategic placement of vegetation.

INDOOR ENVIRONMENTAL QUALITY – ACOUSTICS

Highlights the impact of acoustic quality on student attention, comprehension, and academic performance. Strategies to reduce background noise, intrusive noise, and reverberation include:

- Turning off unnecessary equipment when not needed.
- Scheduling student presentations during minimal external noise.
- Moving speakers and listeners closer together.
- Rearrange desks if possible.
- Sealing gaps around windows, doors, or walls.
- Installing weatherstripping under hallway doors.
- Checking with Facilities Manager for ventilation issues.
- Adding soft surfaces and strategically placing acoustic tiles or baffles.



TAKING ACTION

- Turn off noise-making equipment when not needed.
- Communicate acoustic issues with facilities or custodial staff.
- Request weatherstripping or other materials to reduce noise intruding on the classroom.
- Advocate for policies to eliminate or reschedule noisy activities.

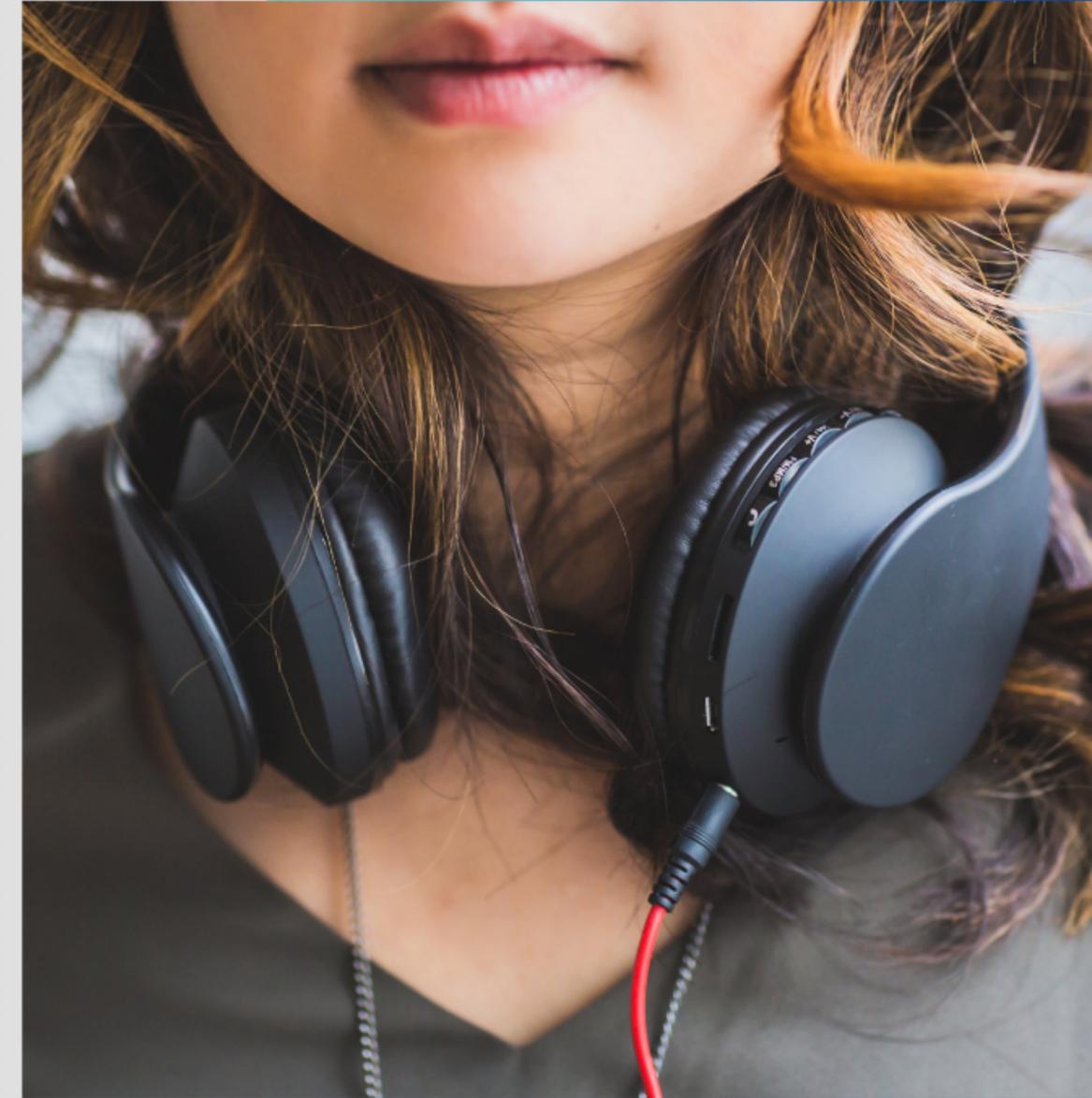
Conduct acoustic testing.

- Consider the surrounding environment when designing classroom layouts.
- Install noise reduction equipment such as ceiling tiles, baffles, and soft surfaces.



ACOUSTICS IN SCHOOL BUILDINGS

- Role of Acoustics: Poor acoustics can lead to increased noise levels, disrupting concentration and hindering comprehension.
- Sources of Noise: External Noise: Traffic, construction, and playground activities can introduce external noise into classrooms.
- Effects of Noise on Learning: Excessive noise can have detrimental effects on student learning and behavior.
- Strategies for Acoustics Improvement: Architectural design, sound-absorbing materials, zoning, and technological solutions can create an acoustically favorable environment.



INDOOR ENVIRONMENTAL QUALITY (IEQ) AND ACOUSTICS

- IEQ includes air quality, lighting, thermal comfort, and ergonomics.
- Acoustics studies sound transmission and its effects on individuals.
- Acoustics in educational settings significantly influences pedagogical outcomes, student engagement, and overall well-being.



IMPORTANCE OF NOISE CONSIDERATIONS IN GREEN CLASSROOMS

- Noise increases cognitive load and learning.
- High noise levels can induce stress in students, leading to increased anxiety and behavioral issues.
- Noise can hinder effective communication, especially in collaborative learning strategies.



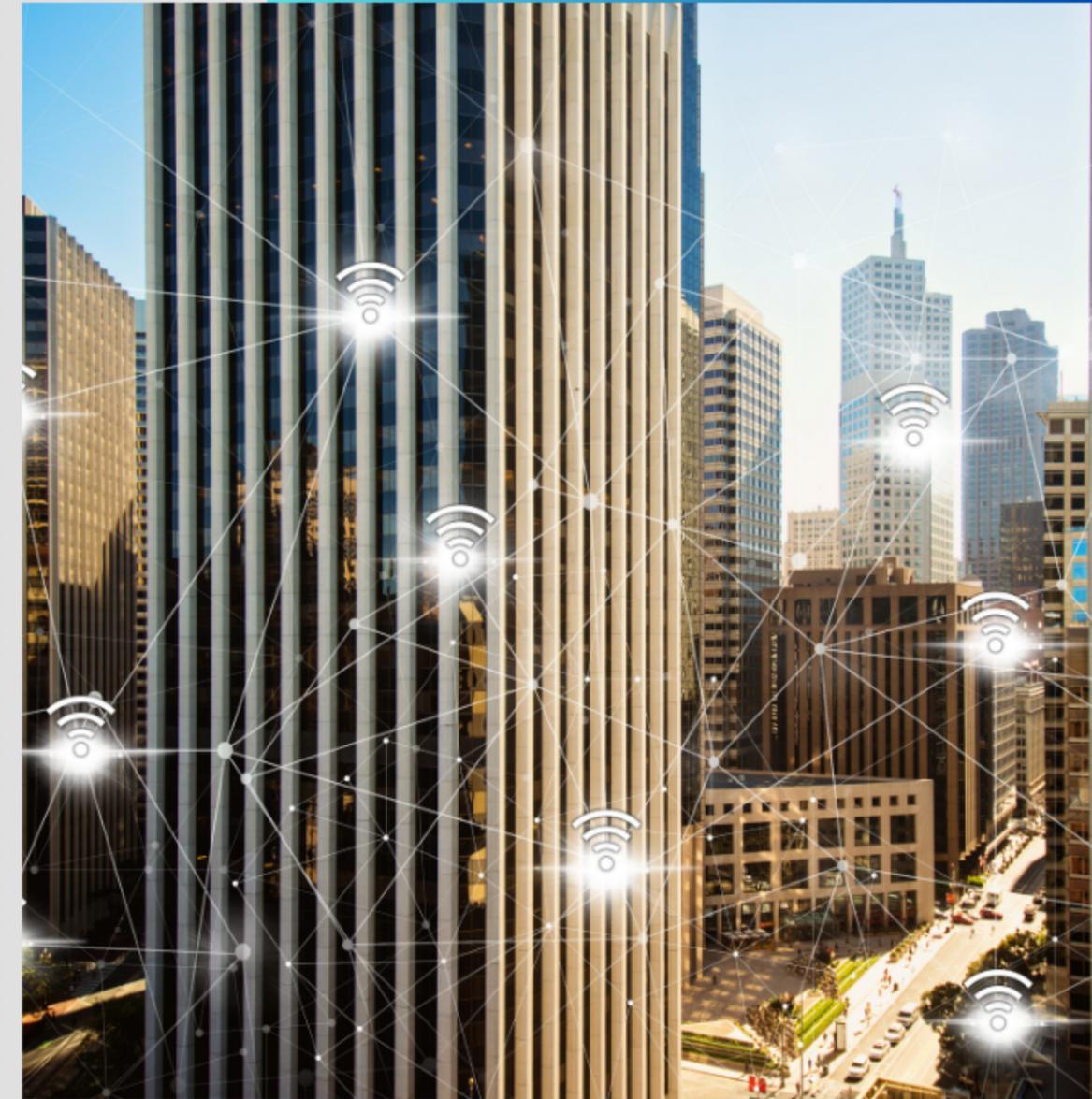
IMPACT OF NOISE IN THE LEARNING ENVIRONMENT



- Acoustic conditions correlate with academic performance.
- Prolonged exposure to high noise levels can have adverse health effects.
- A noisy classroom can disrupt social interactions and collaborative learning opportunities.

STRATEGIES TO LIMIT NOISE IN THE CLASSROOM

- Architectural design: Use of sound-absorbing materials can mitigate noise.
- Zoning and Layout: Separate noisy activities from quieter areas.
- Acoustic Barriers: Installing sound walls or partitions can contain noise within designated areas.
- Behavioral Guidelines: Establishing behavioral expectations around noise can promote respect for the learning environment.
- Acoustic Testing and Monitoring: Regularly assessing the acoustic quality of classrooms can help identify issues and inform interventions.



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THANK YOU

