SUPPORTING STUDENT ACHIEVEMENT BY CONSIDERING NOISE

by Sandra Soraci

Flooring, the foundation of the built-environment, is more than aesthetics—it is a structural component that supports learning, health and wellness, operational efficiency and safety.

The environment in which we complete certain tasks or activities can have a far-reaching impact on performance, health and wellness. Playing a game of soccer outside in 104-degree weather or torrential rain is undeniably more difficult than playing in an indoor air-conditioned facility. The added burden of playing through increased exhaustion due to heat, or blurred vision because of rain can greatly impact one's performance to a point where a player's experience associated with the game is altered.

Similarly, in education spaces, the surrounding environment can affect students and professors both positively and negatively, impacting their success and well-being, and ultimately, impacting how a student's academic journey may unfold. Universities should carefully consider the selection and specification of interior finishes as they play a vital role in the overall learning experience in the built environment. When the right product is placed in the right space, positive impacts result for learning and the ability to hear.

Universities must consider how to best support student performance and mitigate unwanted ambient noise. In any space, sound can hinder cognitive understanding of information presented, including a professor's subject matter. Addressing the impact of noise, and the ability to hear what is being said, can be the difference between a high exam score or a failing grade.

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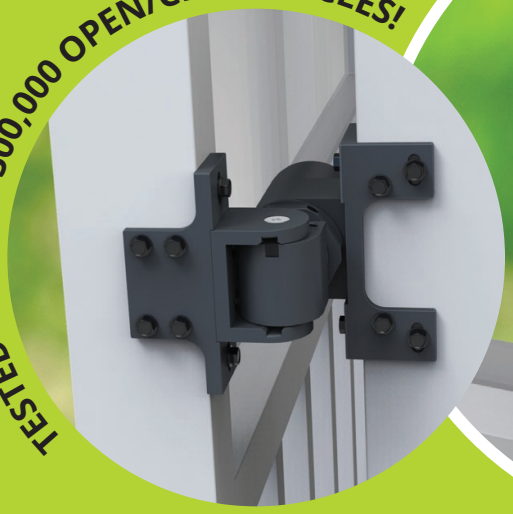

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The Acoustical Society of America estimates many classrooms have a speech intelligibility rating of 75% or less, but the recommended rating is 95%. For students with hearing disabilities or language barriers, this poses a bigger threat.

In the learning environment, floors, walls and ceilings all play a role in noise mitigation, but flooring is too often overlooked as a performance driver that can have an actionable impact on in-room impact sound reduction. The needs of the learning environment define proper flooring selection and specification. With a full understanding of the benefits of flooring in the built environment, the institution ensures an actionable impact on mitigating unwanted ambient noise.

The Devastating Impact of Noise on Learning

Noise is harmful. And, it is a consistent part of our day-to-day interactions with built spaces, including learning environments. In fact, the Acoustical Society of America estimates many classrooms have a speech intelligibility rating of 75% or less, but the recommended rating is 95%. For students with hearing disabilities or language barriers, this poses a bigger threat. The ability to hear and be heard is crucial to student success. Participating in lessons and classroom discussions is a critical element for university performance. However, if students can't hear the teacher, how can they be expected to provide their own insight?

When students cannot hear, their wellbeing and performance is compromised, beyond just hearing loss. Studies show that noise pollution can lead to fatigue, annoyance and stress, as well as impaired attention and cognitive performance. Increased stressors in education environments cause students to experience more difficulty in learning and retaining information, reducing academic growth and hindering student wellness. For students, noise can also affect their ability to multitask and increases the chance of mistakes.

How and Why In-Room Noise Is Measured

Up to this point, noise testing has been focused on the spaces above and under end users rather than in-room impact noise. The current testing standard utilized by resilient flooring manufacturers for acoustic performance is ASTM E2179. Per this standard, structure-borne noise, or noise traveling through the structure of a building, is measured utilizing a tapping machine in a "source" room to measure sound impact in the "receiving" room. However, there is a gap in the testing standards as there currently is no method to measure in-room impact noise transmission and how proper flooring selection can have an actionable impact on the overall soundscape of the learning environment.

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A recent experimental study was conducted to begin a more accurate understanding of flooring on in-room impact noise and reducing unwanted ambient noise. The research focuses on investigating the performance of a range of hard and soft floor coverings with the utilization of varied impactors beyond just footfalls. These impactors include:

- Small and large impactors on a concrete slab
- Different wheel types on a large concrete slab
- Book dropping on a small concrete block
- Metal chair leg on a small concrete block
- Hollow metal sphere on a small concrete block

The study tests premium rubber of varied thickness, PVC-free sheet vinyl with PUR coating, linoleum, PVC sheet vinyl, VCT, carpet tile and luxury vinyl tile. For each experiment, the sound level reduction for the materials is calculated as the difference between the sound level of the same impactor on bare concrete.

The study found that 4 mm premium rubber acoustic flooring is the best resilient flooring product to reduce the impact of in-room noise and can provide greater or equitable noise reductions compared to carpet tile.

The Benefits of Rubber Flooring, Acoustics and Beyond

Premium rubber flooring has inherent benefits for education spaces, and all built environment spaces, even beyond its noise reduction qualities. Compared to other flooring types, rubber products require little more than water for maintenance or cleaning regimens.

With resilient flooring products that require coating, unlike rubber flooring, additional noise and equipment are introduced into the learning environment. Meaning the resilient flooring, which already has lesser sound reduction qualities compared to rubber, also introduces additional noise to the space for maintenance protocols, further impacting student and faculty wellbeing and performance. Even more concerning is the negative impact on indoor air quality due to chemicals needed for the cleaning process associated with coated resilient products. In any space, it is crucial to provide the best indoor air quality possible to minimize the impact of harmful substances, which can potentially lead to occupant health risks, such as headaches, nausea and discomfort.

In addition, with coated resilient floor coverings, glare can become an issue for occupants as the glossy coating reflects light. This glare can cause cognitive and visual fatigue for professors and students, further hindering their ability for learning in the education space.

How Rubber Flooring Supports the Modern Education Space

Similar to the shift in the corporate office sector, education spaces are moving toward the non-traditional classroom model that is no longer defined by just four walls. Instead, large open spaces are utilized and areas within are designated for specific tasks or needs, recognizing that all students are different, and they learn and interact best with others in varied types of spaces.

As this shift occurs, the learning environment must become more agile. With larger open spaces, flooring becomes the forefront interior finish solution to address noise, especially as it becomes more challenging to mitigate. Rubber flooring supports the changing classroom as evidenced by third-party research in terms of in-room impact noise reduction. The learning environment will continue to evolve, but the need to create spaces that promote faculty and student wellbeing and performance will always be paramount.

People can tolerate different levels of noise, but interior finishes in the built environment must play their role and address in-room impact noise. With careful consideration of interior finish selection and specification, colleges and universities can be assured that they are fostering a healthy environment for their students, which is further supported through flooring and its ability to play a role in minimizing in-room impact noise. In addition, when students hear better, they learn more, resulting in student achievement and success for the learning institution.

ABOUT THE AUTHOR: As Marketing Strategy Lead, Healthcare & Education, Sandi Soraci is a thought leader and designer with more than 20 years of experience in these segments. Sandi works to educate and collaborate with customers on flooring performance attributes.

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