Where Musicians Hone Their Craft: Acoustical Designs of Practice and Rehearsal Rooms

By: Ioana Pieleanu

Senior Consultant, Acentech | Studio A

Whether a concert hall, opera house or rehearsal room, accomplished musicians expect the acoustics in the spaces where they play to be a supportive extension of their instruments and their musicality.

Good acoustics are no less important for novice musicians as they enter the musical world. The acoustics of music learning and performing spaces must offer gratification and encouragement to the young player, inviting them to fully experience the emotional act of making music.

When it comes to music, the learning curve is steep and complex. Music students must learn how to correctly hold an instrument, generate sound, read the musical notation and more, all of which can be intimidating and sometimes frustrating. When a music teacher says to a young student, “Listen to yourself,” the student may not have an accurate picture of her musicality due to a poorly-designed space. Instead, she may be distracted by the student practicing next door, or disturbingly loud background noise, or a harsh, loud and dry-sounding practice room. Conversely, a music room that is well-isolated from the adjacent spaces, which is quiet and provides sufficient support and envelopment helps young students to better hear themselves and to have a better sense of the musicality they are working to achieve. A room designed with proper acoustics can provide just the right amount of motivation toward continuing with a musical education.

Critical listening is an important activity for students and instructors at all levels of musical experience. Therefore, musicians are more sensitive to building-related acoustical aspects than are most building occupants. There are three main aspects that define the acoustical environment in a practice room: the acoustical response inside the room, the sound isolation between adjacent spaces, and a quiet background noise level.

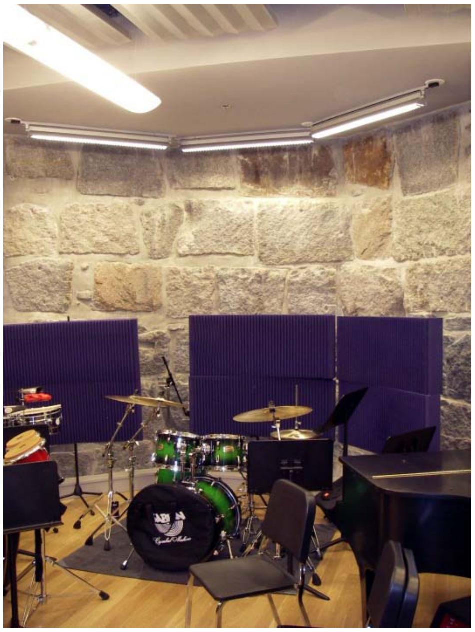
First, room acoustics refers to the quality of sound, in this case music, produced inside the room. The vocabulary for defining the acoustics in a practice/rehearsal room includes reverberation, articulation, diffusion and absorption. Reverberation, or the sound lingering in the room after the sound source stopped, is highly desired by any musician because it enriches the sound, provides acoustical support and results in an immediate sense of satisfaction. Nevertheless, in a space with a small volume, there is a fine line between that degree of beneficial reverberation and the excessive reverberation that is likely to translate into excessive loudness and harshness of the sound. Excessive reverberation and its secondary effects

Timken Room at Phillips Academy Andover, MA

impede the player to hear clearly, fine tune his own sound, or follow the melodic lines of the fellow musicians in an ensemble. In a well balanced room, absorptive and diffusive finishes are employed and strategically distributed so that the sound is articulated, or clear and distinct, yet not dry. Musicians benefit from just the right amount of reverberation that enhances the sound without overpowering it.

The second critical acoustical aspect is the sound isolation of the practice/rehearsal room from the other spaces in the building. Unlike speech, music is rich in low frequency sounds, which are also the most difficult to isolate. Everyone has likely experienced at one time or another faint drum or bass sounds transmitting from an adjacent or nearby space, even if the building appeared to be well isolated otherwise. This is due to the fact that low frequencies excite very effectively the building constructions (walls, floor/ceiling etc.) and consequently transmit through the structure to adjacent spaces or even farther. In order to address this issue and provide sufficient sound isolation at low frequencies, constructions that are structurally detached from each other are necessary. Horizontally, demising constructions consist of double/multiple walls that do not bear rigid contact to each other. Vertically, double/multiple constructions that are connected exclusively by means of vibration isolation systems are usually specified (e.g. a suspended ceiling attached resiliently to the slab and/or a resiliently floating floor). Most importantly, careful supervision is necessary in the field throughout construction, to ensure that the integrity of the structural separation is preserved; otherwise it is virtually impossible to identify a “short-circuit” in the structural isolation, once the construction is completed.

Another effective path for sound transmission between rooms is the crosstalk through the ductwork of heating/ventilating and air conditioning systems. The duct layout in a music building is critical to this end: ducts should not be routed directly from one practice room to another, but rather through corridors with individual branches feeding each room. The goal is to lengthen the duct path between music rooms as much as possible, to allow the sound to be attenuated on the way. Once the layout is established, specific measures are implemented to attenuate the sound as it travels through the duct, such as internal duct lining or sound attenuators and/or external duct enclosures. Because of crosstalk, a fully ducted air return system is also required at music rooms; systems that transfer return air through wall duct transfers



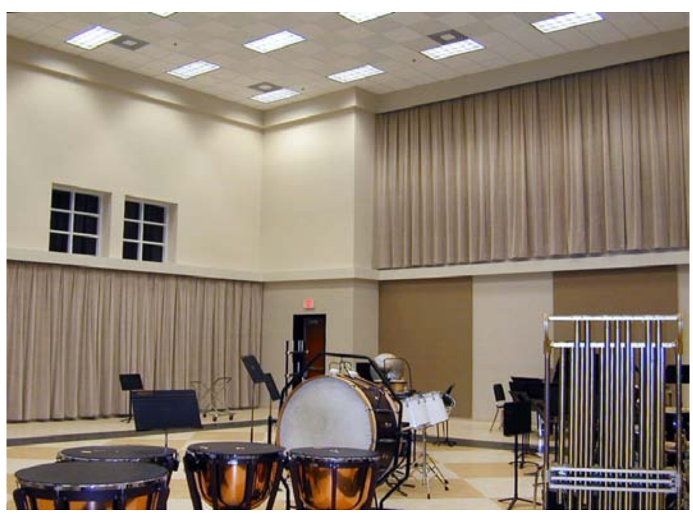
Percussion Studio at Berklee College of Music in Boston, MA create a conduit for sound transmission that defeats the isolation otherwise provided by the wall.

Last but not least, a quiet background noise level must be achieved in the practice rooms; themusician should not have to fight the noise produced by HVAC systems or traffic noise in order to be able to focus on his/her sound. Measures toward achieving a low background noise level start with the selection of quiet mechanical equipment, followed by strategic location of this equipment, positioned remotely from the rooms of concern. Additionally, sound attenuators and duct lining are typically used to control fan noise, large ductwork keeps airflow velocities to a minimum and prevents noise generated by air turbulence, and vibration isolation systems are used to prevent equipment noise transmitting to the building structure.

Depending on the location of the building relative to road or air traffic areas, and also on the location of the outdoor mechanical equipment, sound isolation upgrades of the building shell (windows, roof etc.) are necessary to control the degree of outdoor noise entering the music rooms.

Whenever budget is not a concern, all the acoustical measures discussed above can and should be employed at once, the result being a state-of-the-art music practice complex. However, given that today's economic conditions appear to consistently impose budget limitations, building owners and architects are forced to prioritize the acoustical fit-out. While, acoustically speaking, everything discussed above is of equal importance, in this case priority should be given to those items that, if delayed, would incur expensive costs and implementation challenges. For instance, wall or floor/ceiling constructions for sound isolation are a high priority; upgrading these once the base project is finished would be a very costly and nearly insurmountable task, especially given the resulting disruptions in activities within the building at a later time. Another high priority is the selection of quiet mechanical equipment (even if this is sometimes more expensive at the outset) along with ductwork suitably laid out to prevent crosstalk, and the inclusion of the necessary sound attenuation measures. Post-occupancy mechanical system upgrades are considerably more expensive and difficult to implement into the base system, while the disruption associated with such upgrades may be prohibitive altogether.

On the other hand, upgrading a standard door with an acoustically rated door or upgrading window systems are feasible at later time. Similarly, certain room acoustics measures, such as sound absorptive or diffusive wall or ceiling treatments, can be implemented in a second phase without major disruptions. However, it is essential that the next phase for introducing these treatments is clearly established and that measures toward accomplishing the second phase be incurred early in the design;



Rehearsal Room at Mercer University in Macon, GA otherwise, it is likely that the second phase falls into oblivion, eventually compromising the success of the entire project.

It is also important to discuss clearly and directly with the users the consequences of delaying the implementation of the room acoustic measures. While the sound isolation and background noise levels are a project's functional acoustic aspects, the room acoustics is a key artistic ingredient, and likely the most appraised by musicians. An unfinished room may create a negative first impression on the musicians and may retain that stigma even after the room is improved and completed, unless the musicians are aware of and active participants in the building process. For the same reason, it is preferable that any room acoustic measures that are postponed be implemented simultaneously later, in a single phase. Small incremental changes may remain unnoticed, and even at the end of all upgrades the musicians may not have a clear perceptual sense of the improvement. Instead, when all changes are introduced in the room as a single significant upgrade, the acoustical impact is likely to be noticeable and positively received.

Nothing is more important in music education (or education in general, for that matter) than a good mentor. And when a mentor and his/her students are given the opportunity to work in a suitable and nurturing environment, we trust that there is nothing that can stay in the way of music making a most positive and empowering contribution in the development of a young generation. ■

Ioana Pieleanu has 7 years of acoustical consulting experience with Acentech and a background in piano and music studies. Ioana's acoustics expertise encompasses room acoustics, sound isolation and mechanical systems noise and vibration control. She holds a M.S. degree in Architectural Acoustics from Rensselaer Polytechnic Institute. To contact Ioana, please email her at ipieleanu@acentech.com.