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The Impact of Acoustic Performance on Neurodiverse Students in K-12 Learning Spaces

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Abstract : Good acoustic performance has been identified as one of the critical Indoor Environmental Quality (IEQ) factors for student learning and development by the National Research Council. Childhood presents the opportunity for children to develop lifelong skills that will support them throughout their adult lives. Acoustic performance of a space has been identified as a factor that can impact language acquisition, concentration, information retention, and general comfort within the environment. Increasingly, students learn by communication between both teachers and fellow students, making speaking and listening crucial. Neurodiversity - while initially coined to describe individuals with autism spectrum disorder (ASD) - widely describes anyone with a different brain process. As the understanding from cognitive and neurosciences increases, the number of people identified as neurodiversity is nearly 30% of the population. This research looks at guidelines and standard for spaces with good acoustical quality and relates it with the experiences of students with autism spectrum disorder (ASD), their parents, teachers, and educators through a mixed methods approach, including selected case studies interviews, and mixed surveys. The information obtained from these sources is used to determine if selected materials, especially properties relating to sound absorption and reverberation reduction, are equally useful in small, medium sized, and large learning spaces and methodologically approaching. The results describe the potential impact of acoustics on Neurodiverse students, considering factors that determine the complexity of sound in relation to the auditory processing capabilities of ASD students. In conclusion, this research extends the knowledge of how materials selection influences the better development of acoustical environments for autism students.

Keywords : acoustics, autism spectrum disorder (ASD), children, education, learning, learning spaces, materials, neurodiversity, sound
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