

Multi-Sensory Architecture-A Comfortable Environment for Visually Impaired People

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Abstract: This paper focuses on the important role of multi-sensory architecture in designing inclusive learning spaces for children with visual impairments. Many traditional classrooms are designed mainly for people who rely on sight, which can make it difficult for visually impaired students to feel comfortable and independent. Multi-sensory design uses different senses—such as touch, hearing, smell, and temperature—to help children understand and move through a space more easily. This study explores how these sensory elements in the built environment can improve learning, support independence, and provide emotional comfort. A key example is the award-winning classroom for blind students in Pattaya, Thailand, which shows how thoughtful use of space and sensory details can make education more accessible and engaging. Through such design, architecture becomes not just a physical structure, but a helpful tool for learning and growth.

Keywords: Auditory cues, Accessible learning environments, Blind-friendly Architecture, Multisensory Architecture, Olfactory design, Tactile learning, Universal Design, Visually Impaired Children.

Introduction

With the development of society and the country, the educational needs of the population are steadily increasing. Education is a fundamental right of every individual; however, many students—particularly those who are visually impaired—continue to face significant barriers in accessing quality education. These students often lack adequate infrastructure, resources, and supportive platforms, which limits their educational opportunities and personal growth.

As the number of visually impaired individuals continues to rise globally, architects face an important challenge: to design educational environments that minimize risks and maximize comfort. Although advancements in technology and special education methods have made progress, current learning environments still lack sufficient sensory diversity for visually impaired students.

Multi-sensory architecture offers a promising solution. By designing spaces that engage multiple senses—such as touch, hearing, and smell—architects and educators can create

environments that support learning through experience, movement, and interaction. For example, textured flooring can assist in spatial orientation, sound-enhanced navigation can aid movement, and scent-based cues can help with memory and recognition. These multi-sensory features can transform traditional educational spaces into inclusive and empowering environments.

This research explores how the integration of different sensory elements in classroom design can improve learning experiences for visually impaired children. It examines practical, real-world examples and highlights how such designs not only support cognitive development but also promote emotional well-being. The ultimate aim is to advocate for inclusive architecture that provides equal educational opportunities for every child, regardless of visual ability.

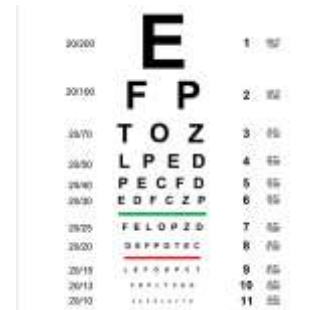


Fig. 1. Snellen Chart

What is blindness?

According to studies **Blindness** is the partial or complete loss of vision in one or both eyes, which can be present from birth (congenital) or acquired later due to injury, disease, or age-related conditions.

It happens due to various reasons like genetic disorder, disease, age related problems, etc.

Some of the types of blindness are:

1. **Congenital Blindness:** Present from birth, often caused by genetic mutations, developmental issues in the eye, or neurological disorders.
2. **Acquired Blindness:** Develops later in life, often as a result of injury, diseases, or conditions such as Cataracts, Glaucoma, etc.

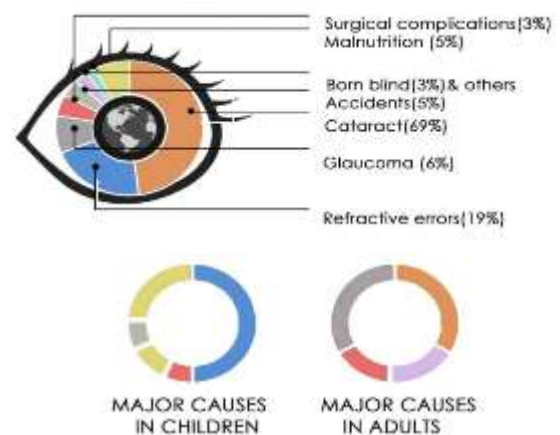


Fig. 2. The figure shows the causes of blindness in children and adults

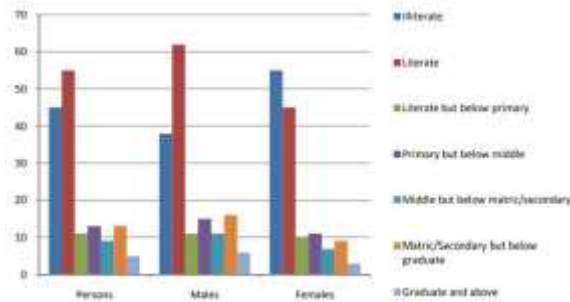


Fig. 3. It shows the percentage of Blind people in different grades

The Role of Architecture in Enhancing Life for Visually Impaired Pupils

Designing for people who are visually impaired means thinking beyond just how things look. Instead of focusing only on visual elements like colors and shapes, designers should consider how people use other senses like **touch, sound, and even smell** to understand their surroundings.

It's important to see people with disabilities not as a problem, but as individuals who often have **stronger other senses**. Research shows that when someone loses their sight, their brain adjusts by improving other senses—like hearing or touch. For example, many blind people become very good at noticing small sounds and understanding what they mean.

Because of these abilities, they can experience and understand the world in ways that sighted people may not. Well-known individuals like **Stevie Wonder, Ray Charles, and Helen Keller** proved that being blind doesn't stop someone from doing great things. Their lives remind us that people with visual impairments have **amazing talent and potential** that can make a positive difference in the world.

What is multisensory architecture?

- **Buildings are experienced through many senses**, not just sight—sound, touch, and smell also play a big role.
- **Multisensory architecture** is important for making spaces easier to understand and use for everyone, including people with disabilities.
- **Architect Juhani Pallasmaa**, in his book *The Eyes of the Skin*, says our experience of space involves more than just vision.
- We use **touch, hearing, smell, and even body awareness** (muscles and bones) to understand a space.
- **Touch is especially important**, as it helps us feel shape, texture, and weight—giving us a sense of depth and space.
- **Philosopher Hegel** believed that only touch gives us a true understanding of depth and spatial relationships.
- For **blind or visually impaired people**, touch is essential to navigate and experience architecture.
- Architects should design spaces that **engage all the senses**, not just sight.
- This approach helps create **inclusive, enjoyable, and easy-to-navigate buildings** for everyone.



Fig. 4. Spaces with the sensory architecture

What Do Blind People See?

Many people who are considered blind still have **some level of vision**. For them, certain design features in buildings can make it easier to understand and move through a space. These features can help both blind and visually impaired individuals by improving their experience and safety.

Some helpful design ideas include:

- **Murals and Bright Colors:** Using bold colors and wall art can act as **visual clues**, helping people with limited vision recognize different areas and enjoy the space more.
- **Changes in Lighting:** Adjusting the brightness in different parts of a building can guide people through the space. **Smooth transitions in light levels** make it easier for visually impaired individuals to see and move safely.
- **Entryways and Hallways:** Designing entrances and hallways carefully—especially in terms of lighting—can help people **adjust their vision** as they move from one area to another, improving their ability to navigate the building.

These simple architectural choices can make a big difference in making spaces more **comfortable, accessible, and inclusive** for everyone.



Fig. 5. Figure shows the vibrant color murals and paintings that can be recognized by blinds



Fig. 6. Figure shows the passage and pathways for the blind

The Relationship Between Architectural Tools and Human Senses

1. Visual Perception and Architectural Design

We mostly understand our surroundings by what we see. Architects use tools like **color, shape, light, and layout** to guide people and set the mood of a space. For example, using **bright colors or high contrast** between floors and walls helps people with low vision move around more easily. Proper lighting is also important—not too dark, not too bright. Sunlight through windows and well-placed lights can make spaces feel more welcoming and easier to navigate.

2. Tactile Interaction

Touch helps us understand materials and surfaces. Different textures—like **smooth marble, rough bricks, or soft fabric**—create a feeling or mood. For people who are blind or can't see well, **touch becomes a way to "see" the space**. Features like **textured flooring, handrails, and Braille signs** help them move safely. Even small things like the feel of a doorknob or the temperature of a surface can give important clues about a space.

3. Acoustic Design and Auditory Sensing

Sound also plays a big role in how we experience a place. Some spaces are designed to be quiet, like libraries, while others echo, like train stations. **The way sound travels in a space helps people understand how big or open it is**. For visually impaired people, sound can guide them—for example, footsteps echoing off walls can give hints about room size or if someone is nearby. Architects use materials like carpets, curtains, and wall panels to control how sound behaves in a room.

4. Olfactory Sensory Influence

The sense of smell, though less directly controlled by architecture, plays a significant role in how people emotionally connect with a place.

We don't always think about smell, but it affects how we feel in a space. A place might smell fresh because of plants, or cozy because of wood or food nearby. For someone who can't rely on their vision, **smell becomes a helpful clue**. A person might recognize a café by the smell of coffee or a garden by the scent of flowers. Smell can make a place feel familiar and safe.

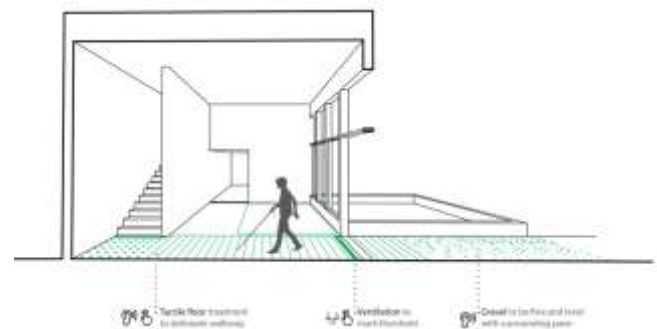
5. Movement and Body Awareness

Our bodies also sense how we move through space. Things like **stairs, ramps, doorways, and hallways** affect how we walk and interact with a building. A well-designed space helps people move naturally and without confusion. For example, ramps with handrails are easier for someone using a wheelchair or cane. Open layouts and smooth pathways help everyone feel more confident moving around.

Texture & Touching

Various architectural tools can be employed to strengthen the sense of touch, especially for blind or visually impaired individuals. These tools enhance navigation and understanding of space, ensuring a more inclusive environment:

- **Tactile Cues in Pathways:** Strategically placed tactile cues, such as raised patterns or textures, in outdoor pathways help guide visually impaired individuals, offering them a sense of direction and safety.
- **Contrasting Flooring Materials:** Using different textures in flooring materials can create contrasts that make it easier for individuals to identify transitions between spaces, such as moving from one room to another or navigating through corridors.
- **Textured Wall Panels:** Implementing tactile wall panels with distinct textures can provide important directional cues. These panels, in combination with specially designed floor tiles, can help individuals understand the spatial layout and orientation of a room or building.
- **Varying Wall Materials:** Differentiating spaces through the use of varied wall materials can serve as a way to categorize areas and help blind or visually impaired individuals recognize changes in the environment.
- **Rhythm in Wall Design:** Creating rhythm in the design of wall panels, such as through patterns or repetition, can enhance spatial comprehension, making it easier for individuals to navigate and identify specific areas within a space.



Spaces and User Understanding Through Building Design

To create a more accessible and navigable space for individuals with visual impairments, the building design must be such that users can easily comprehend the layout and direction within the environment.

One effective way to achieve this is by incorporating a prominent floor plan that allows for easy recognition and orientation within the building.

For example, using distinctive floor tiles can help individuals understand the direction inside the building.

These tiles can be strategically placed to guide people through different spaces, providing a tactile map of the area and making navigation more intuitive.



case study

1. School for blind, Gandhinagar, Gujarat

The school for blind in Gandhinagar, Gujarat is a marvelous example for the multisensory architecture around the world.

Designed by architect Anand Sonecha from SEA lab and completed in 2021, this school in Gandhinagar creates a learning space specially made for children who are blind or have low vision. The design uses more than just sight—it includes features that can be felt, heard, and even smelled to help students find their way and learn better. Built by the Service Association for the Blind, the school provides a safe and caring place to grow, while also showing how architecture can be thoughtful, inclusive, and respectful of every child's needs. The site area is approx. 750 m² in collaboration with Manav Sadhna (NGO), Perkins School for the Blind (USA)

Design philosophy

The school uses a special kind of design called a *multisensory approach*. This means it helps students who are blind or have low vision move around and understand their surroundings by using other senses like touch, hearing, smell, and the small amount of vision they may have.

Key Design Features

1. Tactile Guidance (Touch-based navigation)

The walls and floors have different patterns that students can feel with their hands or feet. These include straight lines, curves, and other shapes that help them know where they are and which direction to go. It's like a built-in map they can feel instead of see.



2. Mathru school for the blind, Bangalore, Karnataka

The Mathru School for the Blind is a special school located in Bangalore, started in 2001 by Ms. Gubbi Muktha. It helps blind and visually impaired children—especially those from poor families—by giving them free education, food, and a place to stay. The school is run by the Mathru Educational Trust and focuses on giving students not just classroom learning but also life skills to live independently.

Education and Activities

- The school follows the Karnataka State syllabus and teaches students from 1st to 10th standard in English medium.

- Apart from studies, students also learn music, drama, public speaking, and take part in sports and other activities.
- These programs help students build confidence and explore their talents.

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Building Design (Architecture)

The school building was designed by Biome Environmental Solutions, with features that make it easier for blind students to feel comfortable and move around safely.

- **Soft Lighting:** The classrooms have soft, natural lighting to avoid bright glares, which can be uncomfortable.
- **Good Air Flow:** The way windows and doors are placed allows fresh air to flow, which also helps students sense direction.
- **Natural Materials:** The walls are made of mud bricks and earth blocks, which are eco-friendly and feel good to touch.
- **Simple Layout:** The building is planned in a way that's easy to understand and move around for students without sight.



CONCLUSION

Using many senses in the design of learning spaces can really help children who are blind or have low vision. When schools include things like textures to feel, sounds to guide, smells to identify places, and open spaces to move freely, it becomes easier for these children to learn and enjoy their environment. This kind of design helps them feel more confident and independent. Learning doesn't just happen through the eyes—so when all the senses are included, schools become better for everyone.⁸

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