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Enhancing Early Childhood Education Environments: A Delphi Survey On The Influence Of Interior Design Elements For Children With Mobility Impairments

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Abstract
This study investigates how interior design elements influence early childhood education experiences for children with mobility impairments. Recognizing that classroom environments significantly impact learning, especially during formative years, the research adopts a structured Delphi method to gather expert consensus on critical design parameters. The multi-stakeholder survey includes inputs from architects, interior designers, special educators, school administrators, NGOs, and parents. A total of 53 indicators were evaluated across seven core parameters including accessibility, sensory comfort, furniture flexibility, and emotional inclusion. Conducted in three rounds, the Delphi process facilitated the prioritization and ranking of elements that contribute most to inclusive learning spaces. A focused case study on Ruchi School in Sonipat, Haryana—where infrastructural gaps and perceptual discomfort were documented—provides real-world validation of survey insights. The findings underscore the urgent need for policy interventions, context-sensitive design strategies, and capacity building among educators and designers. This research contributes to the field by offering a participatory framework to reimagine early learning spaces that are not just accessible but holistically supportive. Ultimately, the study aims to inform future policies, infrastructure guidelines, and design training modules to promote inclusive education environments across India.
Keywords: *Inclusive education, Interior design, Mobility impairment, Early childhood, Universal Design, Delphi method, Accessible classrooms*

INTRODUCTION

Interior environments significantly shape the learning and developmental outcomes of young children, particularly those with mobility impairments. As educational policies increasingly emphasize inclusive practices, the physical space must evolve to support diverse needs. Despite global advancements, many Indian early childhood education (ECE) settings remain inaccessible or inadequately designed. This research investigates the role of interior design elements through a multi-stakeholder Delphi survey.

The physical environment of a classroom plays a pivotal role in shaping the educational experiences of young learners, particularly in early childhood education (ECE), a stage critical for foundational cognitive, emotional, and motor development. Interior design elements—such as spatial layout, lighting, furniture, and accessibility features—not only influence comfort and mobility but also deeply affect the inclusivity and engagement of all learners, especially those with mobility impairments. Research indicates that inclusive and responsive design can significantly enhance learning outcomes, independence, and social integration (Moore, 2008; Steinfeld & Maisel, 2012).

In India, the commitment to inclusive education has been articulated through legislative and policy measures such as the **Right to Education (RTE) Act, 2009**, the **Rights of Persons with Disabilities (RPwD) Act, 2016**, and the **National Education Policy (NEP), 2020**, all of which emphasize equitable access to education for children with special needs. However, despite these frameworks, implementation remains uneven across states, especially in the realm of interior design within early education spaces.

1.1 Need for the Study

Children with mobility impairments often face structural and perceptual barriers in their learning environments—ranging from inaccessible classrooms and inadequate furniture to overstimulating or disorganized spatial layouts. These barriers limit their ability to participate fully in academic and social activities. Although policies exist to promote inclusive education, they frequently lack detailed, design-specific guidance or enforcement mechanisms, particularly for preschool or early primary grades.

Furthermore, there is a notable gap in empirical research that connects **interior design practices** with **inclusive learning outcomes**, especially in the Indian context. While international literature supports the value of Universal Design and sensory-responsive environments, such approaches have yet to be systematically localized or assessed within Indian early education settings (UNESCO, 2020; Bhattacharjee, 2021). This study addresses this gap by focusing on stakeholder perspectives through a Delphi method, aiming to establish consensus on the most critical interior design parameters that support inclusive education for children with mobility impairments.

1.2 Objectives of the Research

The core objectives of this study are outlined below:

1. **To assess the importance** of various interior design elements in supporting early childhood education for children with mobility impairments.
2. **To identify and prioritize design parameters** based on consensus from a diverse panel of stakeholders, including educators, designers, and caregivers.
3. **To contextualize the findings geographically**, with a specific focus on Delhi-NCR and a detailed case study of Ruchi School in Sonipat, Haryana.
4. **To recommend evidence-based design and policy strategies** that promote inclusive classroom environments for young learners with disabilities.

Methodology

Research Design

The research adopts a **mixed-method Delphi design**, which combines structured quantitative inputs with qualitative reasoning through expert consensus. The Delphi technique was selected due to its strength in aggregating judgments from a diverse group of experts without requiring them to meet face-to-face. It is especially effective for topics where empirical evidence is limited, and expert experience becomes critical. The process unfolded over three distinct rounds:

- **Round 1:** Experts rated the importance of 53 predefined interior design indicators.
- **Round 2:** Experts ranked the most influential indicators within each of the eight parameters.
- **Round 3:** Consensus validation and reconfirmation of priority elements based on aggregated insights.

Throughout the process, feedback loops enabled participants to reflect on group responses and adjust their evaluations if desired. The iterative nature ensured a refined consensus while preserving anonymity and reducing dominant bias.

The Delphi survey was complemented by a **case study approach**, focusing on Ruchi School in Sonipat, Haryana. The school served as a real-world example to validate the relevance of selected parameters and highlight ground-level gaps. Field visits, observations, and interviews with local stakeholders enriched the analysis with contextual depth.

This combination of consensus-based forecasting and empirical validation allowed the study to triangulate results from both expert-based indicators and grounded insights, thereby enhancing the reliability and relevance of findings.

Stakeholder Identification

The credibility and success of a Delphi survey largely depend on the selection of knowledgeable and diverse participants. For this study, stakeholders were purposefully identified based on their professional expertise, field experience, and direct engagement with early childhood education or inclusive design. The aim was to ensure a **multi-perspective evaluation** of interior design elements that affect children with mobility impairments.

Selected Stakeholder Groups:

1. **Interior Designers**
   Included for their technical knowledge in designing inclusive and child-friendly learning environments.
2. **Architects**
   Contributed insights on structural accessibility, spatial planning, and compliance with national building codes.
3. **Special Educators**

Provided pedagogical and experiential understanding of how interior elements affect children with disabilities in real classroom settings.

4. **School Teachers**
   Offered ground-level perspectives on daily interactions, classroom usability, and teaching challenges in non-inclusive settings.
5. **School Principals and Administrators**
   Informed the survey from a managerial and infrastructural planning point of view.
6. **Curriculum Developers**
   Helped align spatial and environmental design with pedagogical goals and inclusivity standards.
7. **NGO Representatives and Disability Rights Experts**
   Added advocacy-based perspectives rooted in community engagement, legal awareness, and lived experience.
8. **Parents and Caregivers**
   Represented the lived realities and practical challenges faced by children with mobility impairments at home and school.

Questionnaire Development:

The development of the questionnaire was a foundational step in the Delphi survey, ensuring that each round was rooted in practical, research-based, and contextually relevant insights. The questionnaire was designed to assess the perceived importance of various interior design elements that contribute to inclusive learning environments for young children with mobility impairments.

Basis of Development:

The questionnaire was constructed based on:

- A comprehensive literature review (e.g., Steinfeld & Maisel, 2012; Moore, 2008)
- Policy analysis (e.g., RPwD Act, 2016; NEP 2020)
- Field observations and interviews at Ruchi School, Sonipat
- Expert consultations during the scoping phase

STRUCTURE:

The final questionnaire included 53 design indicators, logically categorized into 8 major parameters. This structure allowed for clarity and alignment with both design theory and classroom needs. Each indicator was phrased in simple, non-technical language to ensure understanding across all stakeholder groups.

The 8 Parameters and Their Focus Areas:

- Universal Design & Inclusion Frameworks → Design principles that ensure learning environments cater to diverse needs from the outset.
- Physical Accessibility & Circulation → Features like ramps, wide walkways, and clear classroom layouts that support mobility and navigation.
- Furniture & Flexible Layouts → Ergonomic, adaptable furniture and room configurations that accommodate different body types and learning styles.
- Sensory & Environmental Comfort → Lighting, color schemes, and noise control that impact emotional regulation and concentration.
- Assistive Technology & Reachability → Tools, devices, and reachable materials that promote independence and access.
- Learning Strategies & Curriculum Design → Spatial support for inclusive pedagogies like Universal Design for Learning (UDL).
- Social Interaction & Emotional Inclusion → Spaces and elements that encourage peer engagement, group activities, and emotional well-being.
- Safety & Emergency Design → Infrastructure and layout considerations that ensure secure evacuation and minimize hazards.

Purpose of Grouping:

Grouping the 53 indicators under these 8 themes ensured:

1. Focused analysis and ranking in each round
2. Thematic consistency across diverse expert perspectives

3. Ease of understanding for non-technical stakeholders like teachers and caregivers
4. Each indicator was rated across Delphi rounds based on importance, then ranked for priority, and finally validated for consensus.

Rounds of Survey:

- Round 1: Importance rating (Very Important / Important / Maybe)
- Round 2: Ranking top indicators within each parameter
- Round 3: Final validation and consensus

Literature Review Summary

Interior design in education has long been underexplored in traditional pedagogy, particularly in the Indian context. However, international scholarship and Indian policy frameworks underscore the significance of physical environments in promoting inclusive learning.

Steinfeld and Maisel (2012), in their landmark book Universal Design: Creating Inclusive Environments, argue that educational spaces should be designed to serve the broadest spectrum of users from the outset. Their framework emphasizes accessible furniture, adaptable layouts, and multi-sensory engagement, all of which are key for children with mobility impairments in early education settings.

Moore (2008) focuses on perceptual comfort in learning environments. In The Children's Physical Environment and Cognitive Development, he identifies how lighting, noise, and spatial layout significantly influence children's cognitive and emotional development. For children with disabilities, calm, predictable, and sensorially balanced classrooms are especially vital.

From a legal standpoint, India has established a strong foundation. The **Rights of Persons with Disabilities (RPwD) Act, 2016** mandates barrier-free access and inclusive infrastructure in schools. The **National Education Policy (NEP), 2020** redefines early childhood education to be inclusive and play-based. Additionally, the **National Building Code (NBC), Part 3 (2016)** provides specific standards for educational buildings, including ramp access, tactile signage, and spatial clearances. Together, these frameworks advocate for physical and perceptual design considerations that align with inclusive education goals.

Stakeholder Groups

In this study, selecting the right stakeholders was essential to ensure a holistic understanding of how interior design affects early childhood education for children with mobility impairments. Given the interdisciplinary nature of the issue, the Delphi survey incorporated voices from both design and education domains, as well as caregivers and advocacy organizations. Each group brought unique expertise, contributing to a comprehensive assessment of design indicators for inclusive learning spaces.

Interior designers were included for their specialized knowledge in shaping the physical environment. Their insights on ergonomics, material finishes, spatial planning, and child-centered aesthetics were vital to understanding how classroom interiors can be adapted to support mobility-impaired children. Similarly, **architects** were engaged for their expertise in structural design and compliance with accessibility standards such as those outlined in the National Building Code (NBC, 2016). They offered macro-level perspectives on circulation, zoning, and infrastructure layout.

Special educators played a key role by sharing practical, experience-based insights from their work with children with disabilities. Their feedback helped link design elements directly to learning challenges and emotional needs in the classroom. Alongside them, **school teachers** provided a real-time understanding of classroom functionality, pointing out how daily teaching activities are affected by layout, furniture, or sensory conditions.

School principals and administrators were crucial to the process because they make institutional decisions about budgets, procurement, and compliance. Their strategic insights were important in evaluating which design interventions are feasible and scalable in real school settings. **Curriculum developers** were also included to ensure alignment between spatial environments and pedagogical frameworks. Their role helped contextualize the design indicators in relation to teaching methods, learning outcomes, and inclusive curriculum delivery.

In addition to education professionals, the study included **NGO workers and disability rights advocates**, who brought in policy knowledge and community engagement perspectives. Their involvement ensured the inclusion of rights-based approaches and helped reflect on infrastructural inequities in underserved

areas. Finally, **parents and caregivers of mobility-impaired children** provided deeply personal, first-hand experiences. Their observations on children's interaction with school interiors added emotional depth and authenticity to the survey.

Together, these eight stakeholder groups formed the backbone of the Delphi process, enabling a balanced, evidence-informed, and context-sensitive prioritization of interior design elements. Their collective expertise bridged the gap between design theory, educational practice, and lived experience—ensuring that the study's outcomes are both practical and impactful.

Key Parameters and Survey Findings

To understand which interior design elements most significantly affect inclusive early childhood learning environments, the Delphi study categorized 53 indicators under seven primary parameters. Each parameter consisted of 5 to 8 indicators and was assessed for its perceived importance across stakeholder groups. The average importance scores were calculated to prioritize areas of intervention.

Table 1 : **RANKING OF FINAL PARAMETERS AS PER WEIGHTAGE GIVEN BY THE STAKEHOLDERS**

Source: Author

Parameter	Indicator	Question	%	%Avg	Rank
Universal Design & Inclusion Frameworks	UDL	teaching methods that support all types of learners	54.9	43	1
	Inclusive Design Culture	a school culture that supports every child's needs	38		
	Universal Design Principles	basic rules to make classrooms work for all	33.8		
	Comprehensive Universal Design Principles	complete set of classroom design rules for all needs	45.1		
Physical Accessibility & Circulation	Accessible Pathways	clear walkways and routes for children with wheelchairs or walkers	36.6	35.8	3
	Clear Circulation	easy movement inside the classroom	32.4		
	Reachable Materials	books and supplies kept where all children can reach	31		
	Signage	clear signs and labels in classrooms	42.3		
	Accessible Classroom Designs	rooms planned for all types of children	35.2		
	Accessible Design Features	things like ramps, handrails, or wide doors	38		
	Walkways	safe paths inside and outside classrooms	35.2		
	Classroom Accessibility	classrooms where every child can move and learn easily	38		
Furniture & Flexible Layouts	Height-adjustable furniture	tables and chairs that can be changed to fit each child	31	35.2	4
	Ergonomic Furniture	furniture that supports good posture and comfort	33.8		
	Classroom Configuration	how desks, chairs, and shelves are arranged	38		
	Flexible Content	lessons that work for many types of learners	39.4		

	Flexible Furniture	furniture that can be changed around easily	31		
	Classroom Layout	how the room is set up	35.2		
Sensory & Environmental Comfort	Color and Contrast	using different colors to make things easy to see	45.1	34.8	5
	Environmental Supports	things in the room that help children feel comfortable	31		
	Color and Lighting	how color and lights help learning	30.6		
	Spatial Planning	planning space so everyone can use it easily	33.8		
	Sensory Integration	helping children use all their senses to learn	35.2		
	Visual Accessibility	making sure things are easy to see	32.4		
	Spatial Awareness	helping children know where things are in the room	35.2		
Social & Emotional Inclusion	Inclusive Play Areas	play zones all children can enjoy	45.1	38.7	2
	Protected Play Areas	safe places to play inside or outside	35.2		
	Peer Interactions	children learning and playing together	39.4		
	Inclusive Playground Design	outdoor play spaces for everyone	33.8		
Safety & Emergency Design	Safety Measures	features that protect children from harm	33.8	33.8	6
Learning Strategies & Curriculum	Classroom Inclusion Strategies	ways to include all children in class activities	32.4	33.1	7
	Learning Spaces	places where children learn	38		

Universal Design & Inclusion Frameworks (43.7%) emerged as the highest-rated parameter. Stakeholders such as interior designers and curriculum developers emphasized that integrating inclusive design from the outset creates universally supportive environments. For architects and policymakers, this reinforced the necessity of planning spaces that naturally accommodate all users.

Sensory & Environmental Comfort (38.4%) and **Social & Emotional Inclusion (38.3%)** followed closely, with special educators and parents prioritizing features like calming color schemes, tactile supports, and emotionally safe zones. These aspects were seen as critical to reduce anxiety and improve learning focus among mobility-impaired children.

Physical Accessibility & Circulation (36.2%) was particularly emphasized by architects, disability rights NGOs, and school principals. Elements such as ramps, accessible paths, and well-spaced classrooms were considered essential for safety and independence.

Furniture & Flexible Layouts (35.6%) was championed by teachers and special educators who valued adjustable and ergonomic furniture that could accommodate different physical needs.

Learning Strategies & Curriculum (35.1%) reflected the need for spatial environments to complement inclusive teaching methods. Curriculum developers and school principals rated this highly due to its implications on pedagogy.

Safety & Emergency Design (33.8%) received comparatively lower but still significant attention. Interior designers and NGOs noted that while often overlooked, emergency exits, visual alarms, and tactile signage are vital for the safety of children with disabilities.

These percentages not only reflect the perceived importance of each category but also illustrate how stakeholder roles influenced their prioritization. Together, the rankings provide a multi-dimensional blueprint for redesigning learning spaces that are physically accessible, perceptually comfortable, and emotionally inclusive.

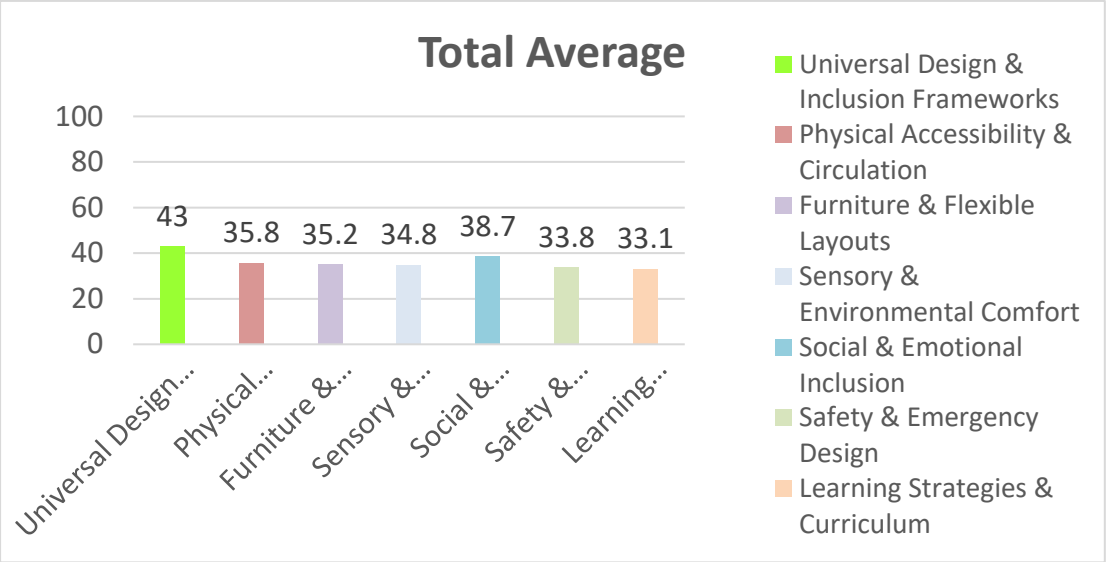

Figure 1Total Average Percentage as per all stakeholder
Source: Author

Case Study: Ruchi School, Sonipat

The selection of **Ruchi School in Sonipat, Haryana**, as the case study location for this research was both strategic and evidence-based. Haryana, despite moderate literacy levels and policy alignment with national inclusion mandates, exhibits considerable variability in implementation—especially in semi-urban areas like Sonipat. While the state has taken strides in promoting inclusive education under the RPwD Act (2016) and NEP (2020), there exists a wide gap between policy and practice at the ground level.

Ruchi School was identified as an early childhood education institution that, although expressing inclusive intent, had limited infrastructure tailored for children with mobility impairments. This made it an ideal candidate for documenting real-world design challenges and validating the Delphi survey findings.

Key Observations from Field Study at Ruchi School

Physical Design Gaps:

1. Classrooms lacked **height-adjustable furniture**, restricting comfort and functionality for children using wheelchairs or mobility aids.
2. **Doorways and pathways were narrow**, impeding smooth movement and violating universal accessibility norms.
3. **Tactile cues and visual signage were absent**, making navigation difficult for children with visual impairments or sensory processing issues.

Perceptual Comfort Deficiencies:

1. Lighting was inadequate and uneven, contributing to **visual discomfort** and poor learning focus.
2. Classrooms were **overcrowded**, with inflexible layouts that did not support differentiated learning or ease of mobility.
3. There were **no therapeutic or low-stimulation zones**, reducing options for emotional regulation or quiet time, especially important for neurodiverse or mobility-challenged children.

Stakeholder Feedback:

1. Interviews with teachers, parents, and administrators revealed a **lack of awareness about inclusive interior design practices**.
2. Educators expressed the need for **state-supported capacity building**, infrastructure investment, and practical design guidelines for inclusive education.
3. Local NGOs and caregivers highlighted that **Sonipat has limited special schools or interventions** for early childhood care, making Ruchi School's limitations more pronounced.

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Ruchi School exemplifies the everyday institutional realities that children with disabilities face in tier-2 urban regions. Its **partial implementation of inclusive policies**, **visible design limitations**, and **stakeholder openness to improvement** made it a suitable test site to ground Delphi survey recommendations in practical evidence. Moreover, Sonipat's position in Haryana's educational map—with its **lower number of special schools**, **inconsistent infrastructure**, and **policy implementation gaps**—further justifies the selection from both research and reform perspectives.

Figure 2 Issues in Ruchi School
Source: Author

DISCUSSION

The findings of this research reveal critical insights into the intersection of policy, perception, and design practice in early childhood education settings for children with mobility impairments. The Delphi survey and field-level case study both demonstrate the challenges and opportunities in operationalizing inclusion through interior design.

7.1 Policy vs. Practice Gap

While national mandates such as the Rights of Persons with Disabilities (RPwD) Act, 2016, the National Education Policy (NEP), 2020, and the National Building Code (NBC), 2016 provide a strong legal and planning framework for inclusive infrastructure, actual implementation remains fragmented and inconsistent—particularly at the early childhood level.

The case of Ruchi School in Sonipat highlights this gap: despite formal compliance with broad education policies, the school lacked the essential interior design elements that enable true inclusion, such as tactile guidance, adjustable furniture, and therapeutic spaces. This reflects a **systemic gap in interpreting policy into design action** at the institutional level.

Awareness Disparities Among Stakeholders

Survey analysis showed a significant **disparity in understanding and prioritization of interior design concepts** among different stakeholder groups. Specifically:

School teachers and parents often rated critical design parameters (like Universal Design, sensory integration, or flexible furniture) lower than other stakeholders. This suggests a lack of exposure or formal training in inclusive design principles and their impact on learning outcomes. For many, accessibility was equated with only physical mobility aids, not holistic sensory or perceptual considerations.

On the contrary, **special educators and interior designers** consistently rated **sensory-friendly design**, **furniture flexibility**, and **environmental comfort** as among the most influential indicators. Their lived experience with children with disabilities or their professional understanding of user-centered design gave them a more nuanced perspective.

Critical Role of Flexibility and Sensory Design

Two of the most emphasized parameters across stakeholders—particularly special educators and designers—were:

- **Flexible Layouts and Furniture:** Movable desks, height-adjustable tables, and ergonomic seating were identified as essential for supporting different physical postures, assistive technologies, and collaborative learning models. Their absence was frequently linked to discomfort, restricted movement, and reduced participation.
- **Sensory and Environmental Comfort:** Elements like calming color palettes, natural lighting, sound insulation, and tactile surfaces were highlighted as directly impacting children's **focus, emotional regulation, and behavior**. In many schools like Ruchi, these features were either poorly implemented or entirely absent.

These findings reinforce existing literature (e.g., Moore, 2008; Steinfeld & Maisel, 2012) on the **cognitive and emotional importance of the learning environment**, particularly for children with diverse needs.

Towards an Inclusive Design Mindset

The divergence in stakeholder responses indicates that achieving inclusive design in education will require more than policy reform—it demands a **cultural and professional shift in mindset**:

- Teachers and school leaders must be trained not only in pedagogy but also in the spatial and sensory needs of diverse learners.
- Parents must be empowered to advocate for their children's environmental needs.
- Designers must be embedded in early education planning, not consulted as an afterthought.

Only when all stakeholders share a common understanding of inclusive design, can true systemic change take place.

Recommendations

1. Integrate UDL Principles in ECE Teacher Training

What this means:

Universal Design for Learning (UDL) is an educational approach that aims to accommodate the learning needs of all students by offering multiple means of engagement, representation, and expression (CAST, 2011). Despite its global acceptance, UDL remains largely absent in Indian pre-service and in-service training programs for early childhood educators.

Why it matters:

Your Delphi results showed that **teachers and principals** often lacked awareness of inclusive interior design concepts, which directly affects their ability to implement them. Without understanding UDL, educators may unknowingly create classroom environments that exclude children with mobility impairments.

Recommendation:

UDL principles should be embedded into the **curricula of B.Ed., D.El.Ed., and ECCE certification programs**, particularly modules on classroom management, learning environments, and inclusive practices. Practical sessions should train teachers on classroom layouts, flexible resources, and multi-sensory instruction.

2. Revise School Infrastructure Grants to Include Sensory-Friendly Design

What this means:

Current government schemes like **Samagra Shiksha Abhiyan** allocate funds for classroom construction and basic infrastructure but do not explicitly mandate features like acoustic treatment, color contrast, or lighting standards that cater to sensory needs.

Why it matters:

The case study at Ruchi School and stakeholder feedback highlighted **perceptual discomfort**—poor lighting, echoing walls, and overstimulating visuals—as key issues affecting children with mobility and sensory impairments.

Recommendation:

Infrastructure grants should be revised to include checklists for sensory-friendly features, such as:

- Low-glare lighting
- Sound-absorbing materials
- Non-slip, tactile flooring
- Calming color palettes These should be made mandatory for new classrooms and encouraged in retrofits.

3. Promote Flexible Furniture Procurement for Government Schools

What this means:

Most government schools in India receive bulk furniture based on standardized dimensions and fixed layouts, which fail to accommodate children with physical disabilities.

Why it matters:

Your survey identified **height-adjustable furniture, movable desks, and ergonomic seating** as high-priority needs for mobility-impaired children. However, schools lack both awareness and procurement autonomy to choose flexible options.

Recommendation:

Central and state governments should create **procurement catalogs that include modular and adjustable furniture** options. Additionally, **pilot schemes** should fund a certain percentage of schools each year to upgrade to flexible furniture models. Procurement guidelines should be linked to inclusive education benchmarks.

4. State-Specific Audits and Funding Allocations (e.g., Sonipat Pilot)

What this means:

Inclusive infrastructure implementation varies widely across Indian states and even more so at the district level. While some metro areas like Delhi have progressed, regions like Sonipat (as per your field study) show visible infrastructural and policy lag.

Why it matters:

Generic national programs do not address **localized disparities**. The Ruchi School case revealed a severe gap in both **design quality and policy execution**. Stakeholder feedback supported the need for **district-level diagnostics and tailored interventions**.

CONCLUSION

The study reaffirms that **interior design in early childhood education (ECE) settings is a powerful determinant of inclusion, participation, and learning**—particularly for children with mobility impairments. While traditional discourses around inclusive education often focus on pedagogy or curriculum, this research positions **spatial and sensory environments as equally critical**.

Inclusive interior design is **not limited to physical accessibility**—such as ramps or wide doorways—but extends to how a space feels, functions, and fosters **holistic development**. Children with mobility impairments benefit not only from height-adjustable furniture or barrier-free movement, but also from **calming color palettes, predictable spatial layouts, sensory zoning, and emotional safety**. This comprehensive understanding shaped the foundation of the research.

Delphi Insights and Stakeholder Consensus

Using a Delphi method, the study successfully engaged a wide spectrum of stakeholders—**designers, educators, parents, NGOs, and policy experts**—to generate collective consensus on what design elements matter most. Across three rounds of iterative feedback and ranking, the following was revealed:

- **Universal Design & Inclusion Frameworks** emerged as the most important parameter (avg. 43.7%), confirming that early intervention in design mindset is essential.
- **Sensory & Environmental Comfort** and **Social & Emotional Inclusion** also ranked highly, especially among special educators and parents.
- Stakeholders identified gaps between national policies and school-level practices, emphasizing the **urgency of implementation frameworks** tailored to local needs.

How the Study Answers Its Objectives

- **To assess the significance of interior design elements in early childhood education settings for mobility-impaired children:**
  ✓ Achieved through Delphi rounds where 53 indicators were evaluated for importance and feasibility. Elements like lighting, flexible furniture, and sensory zoning were rated highly.
- **To identify and rank design parameters based on expert consensus using the Delphi method:**
  ✓ All 8 parameters were ranked, with Universal Design scoring the highest, followed by Sensory Comfort and Emotional Inclusion—demonstrating cross-sector alignment.

- **To contextualize findings within the regional landscape, focusing on Delhi-NCR with a case study of Sonipat:**
  ✓ The **Ruchi School case study in Sonipat** illustrated real-world infrastructural and perceptual design gaps, validating survey findings and revealing implementation deficits in Tier-2 districts.
- **To provide design and policy recommendations based on stakeholder insights:**
  ✓ Recommendations include revising infrastructure grants, training teachers in Universal Design for Learning (UDL), and district-level audits—especially piloting reforms in areas like Sonipat.
- **To promote awareness and application of Universal Design and sensory-friendly environments in ECE infrastructure:**
  ✓ The study's dissemination model—via stakeholder-specific data visualization, policy briefs, and school-based training models—ensures the findings are both **usable and scalable**.

The study highlights that **inclusion is not an afterthought—it is a design principle**. Environments that are physically accessible, perceptually supportive, and emotionally inclusive are foundational to equitable learning. Moving forward, India's inclusive education agenda must **move from policy intent to design reality**, supported by **multi-stakeholder collaboration and evidence-based implementation**.

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