

# Investigating Universal Accessibility in Primary Schools in Pune

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**Abstract**—This research paper explores the concept of inclusive education, with a particular focus on the user experience and accessibility features within schools. Inclusive education promotes the belief that all students, regardless of their abilities, can thrive in environments designed to support diversity, equity, and collaboration. The study aims to evaluate the effectiveness of school infrastructure and policies in promoting universal accessibility, examining how these elements accommodate the needs of individuals from diverse backgrounds and abilities. Through a comprehensive analysis of existing universally accessible schools, the research delves into the challenges, practices, and resources that contribute to equitable access for students, staff, and visitors. By investigating the current state of inclusivity in educational settings, this paper seeks to provide insights into how schools can better meet the needs of differently-abled individuals and foster an environment of academic, social, and emotional growth for all.

**Keywords**—Universal Design; Inclusive education; Accessibility Audit; Retrofitting measures.

## I. INTRODUCTION

A school is a place where children gather to learn and get education which helps stimulate their sensible brains. This opportunity to learn should not be missed by the differently abled children. Inclusive education promotes the belief that all students can learn and succeed when provided with appropriate support and opportunities for participation. It challenges traditional notions of segregation and exclusion in education and aims to create educational environments where every student can thrive academically, socially, and emotionally. Inclusive education includes equity, diversity and inclusion, accessibility, collaboration, differentiated instruction, Universal Design for Learning (UDL) (Sewell, Kennett, & Pugh, 2022).

The aim of the research is to study the universal accessibility in schools in Pune. The primary objective of this research report is to meticulously analyse and evaluate both the user experience and the accessibility features, delving into their intricacies, functionalities, and effectiveness through

conducting an accessibility audit. Objectives are to facilities and resources, to evaluate the effectiveness and functionality of the building's design and infrastructure in accommodating universal accessibility conduct a comprehensive examination of the universal accessibility provided to users, assessing the degree to which individuals of diverse backgrounds, abilities, and needs can navigate and utilize the standards, focusing on its usability, adaptability, and inclusivity for all users, to analyse and document the existing state of universally accessible schools, investigating their policies, practices, resources, and challenges in ensuring equitable access and participation for students, staff, and visitors from diverse backgrounds and abilities.

## II. SCOPE AND LIMITATIONS

- The research focuses specifically on day schools located in Pune, India. It aims to provide insights into the accessibility status of educational institutions within this geographical area.
- Accessibility issues may arise during the data collection process, particularly if certain schools or facilities are not fully accessible to researchers or if participants face barriers in providing their input.

## III. METHODOLOGY

The method used is Case study. In the case study non-participatory Observation would be used. The unit of analysis is school building and campus. Dependent variable is accessibility level and independent variable is Design and Infrastructure Features. Tools used are case studies and surveys.

- **Sampling and case selection**- 3 Schools from different areas of Pune.
- **Time frame for the study**- Cross-section study for one year. Case study needs to be done during the working time of the day school if allowed preferably.
- **Ethical considerations**- Consent from school authority.

## IV. LITERATURE REVIEW

## A. Universal Design-

It is the process of creating products, environments, and services that are inherently accessible to all people, regardless of age, ability, or other factors. It aims to ensure inclusivity by accommodating the widest range of human diversity, promoting ease of use for everyone without the need for adaptation or specialized design. A key definition comes from Ron Mace, one of the pioneers of the concept: *"Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design"* (Mace, 1985).

## B. Inclusive education-

It is an educational approach that ensures all students, regardless of their abilities, backgrounds, or learning needs, are provided with the same opportunities to participate and succeed in the classroom. It emphasizes equality, where students with disabilities or other diverse needs are not segregated but included in general education settings with appropriate accommodations and support. Inclusive education aims to foster an environment where all students, whether differently abled or neurotypical, learn together and benefit from diverse perspectives, which enriches the learning process for everyone (Ainscow, 2005; UNESCO, 1994).

Inclusive education is rooted in principles of equity, diversity, and respect for individual differences. It opposes the traditional model of segregated education systems, where students with disabilities were placed in separate classes or schools. Instead, inclusive education focuses on providing personalized support through practices like differentiated instruction, collaboration between teachers and support staff, and the implementation of Universal Design for Learning (UDL) strategies (L.Florian, 2014). By creating an adaptable learning environment, inclusive education ensures that every student has the chance to thrive academically, socially, and emotionally.

## V. CASE STUDIES

The methodology used for case study is conducting an accessibility audit which is prepared from parameters studied from **NBC 2016 Part 3**, which addresses "Development Control Regulations and Building Services," and the **Harmonized Guidelines** for creating barrier-free environments in both public and private buildings.

TABLE I. ACCESSIBILITY AUDIT OF CASE 1

Sr. No.	Parameters	Remark & Condition	Score
<b>External Accessibility</b>			
1	Parking	Yes, only 2-wheeler, no dedicated parking	0

1.1	Accessible parking	No	0
1.2	Parking signage	No	0
1.3	Proximity to Entrance	Yes	1
2	Entrances		
2.1	Ramps	Yes	1
2.2	Steps	Yes	1
2.3	Door width	1.8m, 1.2m	1
2.4	Automatic doors	No	0
3	Pathways		
3.1	Surface condition	Paved & undulated	0
3.2	Width	3m	1
3.3	Obstacles	Yes	0
<b>Internal Accessibility</b>			
1	Hallways & Corridors		
1.1	Width	1.2m	0
1.2	Signage	No	0
2	Classrooms		
2.1	Door width	1m	0
2.2	Desk & Seating arrangement	Congested	0
2.3	Technology accessibility	Available	1
3	Common Areas		
3.1	Canteen	Accessible	1
3.2	Library	Not Accessible	0
3.3	Auditorium	Accessible	1
4	Restrooms		
4.1	Accessible stalls	No	0
4.2	Grab bars	No	0
4.3	Sink & mirror heights	No	0
<b>Vertical Circulation</b>			
1	Stairs	1.5m wide	1
2	Handrails	No	0
3	Step height & Depth	150mm & 300mm	1
4	Elevator	Yes	1
<b>Emergency Procedures</b>			
1	Evacuation plan	Yes	1
2	Visible & Audible alarms	Audible alarm available	1

3	Evacuation routes	Through staircases & ramps	1
4	Assistance for Individuals with disabilities	Yes	1
5	Accessibility of fire extinguishers	Yes	1
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TABLE II. ACCESSIBILITY AUDIT OF CASE 2

Sr. No.	Parameters	Remark & Condition	Score
	<b>External Accessibility</b>		
1	Parking	Yes	1
1.1	Accessible parking	Yes	1
1.2	Parking signage	No	0
1.3	Proximity to Entrance	Yes	1
2	Entrances		
2.1	Ramps	Yes	1
2.2	Steps	Yes	1
2.3	Door width	3m	1
2.4	Automatic doors	No	0
3	Pathways		
3.1	Surface condition	Paved & undulated	0
3.2	Width	3m	1
3.3	Obstacles	No	1
	<b>Internal Accessibility</b>		
1	Hallways & Corridors		
1.1	Width	1.8m	1
1.2	Signage	No	0
2	Classrooms		
2.1	Door width	1.2m	1
2.2	Desk & Seating arrangement	Well arranged	1
2.3	Technology accessibility	Available	1
3	Common Areas		
3.1	Canteen	Accessible	1
3.2	Library	Accessible	1
3.3	Auditorium	Accessible	1
4	Restrooms		
4.1	Accessible stalls	No	0
4.2	Grab bars	No	0

4.3	Sink & mirror heights	No	0
	<b>Vertical Circulation</b>		
1	Stairs	1.8m wide	1
2	Handrails	Yes	1
3	Step height & Depth	150mm & 300mm	1
4	Elevator	Yes, 2	1
	<b>Emergency Procedures</b>		
1	Evacuation plan	Yes	1
2	Visible & Audible alarms	Audible alarm available	1
3	Evacuation routes	Through staircases & ramps	1
4	Assistance for Individuals with disabilities	Yes	1
5	Accessibility of fire extinguishers	Yes	1
			24/30

TABLE III. ACCESSIBILITY AUDIT OF CASE 3

Sr. No.	Parameters	Remark & Condition	Score
	<b>External Accessibility</b>		
1	Parking	Yes	1
1.1	Accessible parking	No	0
1.2	Parking signage	No	0
1.3	Proximity to Entrance	Yes	1
2	Entrances		
2.1	Ramps	No	0
2.2	Steps	Yes	1
2.3	Door width	3m	1
2.4	Automatic doors	No	0
3	Pathways		
3.1	Surface condition	Paved	1
3.2	Width	4.5m	1
3.3	Obstacles	No	1
	<b>Internal Accessibility</b>		
1	Hallways & Corridors		
1.1	Width	2.4m	1
1.2	Signage	No	0

2	Classrooms		
2.1	Door width	1.2m	1
2.2	Desk & Seating arrangement	congested	0
2.3	Technology accessibility	Available	1
3	Common Areas		
3.1	Canteen	Accessible	1
3.2	Library	Accessible	0
3.3	Auditorium	Accessible	0
4	Restrooms		
4.1	Accessible stalls	No	0
4.2	Grab bars	No	0
4.3	Sink & mirror heights	No	0
	<b>Vertical Circulation</b>		
1	Stairs	1.5m wide	1
2	Handrails	Yes	1
3	Step height & Depth	150mm & 300mm	1
4	Elevator	No	0
	<b>Emergency Procedures</b>		
1	Evacuation plan	Yes	1
2	Visible & Audible alarms	Audible alarm available	1
3	Evacuation routes	Through staircases & ramps	1
4	Assistance for Individuals with disabilities	Yes	1
5	Accessibility of fire extinguishers	Yes	1
			19/30

## VI. DATA ANALYSIS & FINDINGS

Retrofitting measures to make the building physically accessible, according to the **National Building Code of India (NBC)** and **Harmonized Guidelines for Accessible Environments**, focus on providing universal access for people with disabilities. Following are retrofitting measures for case1:

### A. Ramps and Entrances

**Ramp Slope:** Provide ramps with a slope not steeper than **1:12**. The width should be **1200 mm** minimum, and the surface should be **slip-resistant**.

1. **Handrails:** Install handrails on both sides of the ramps and stairs at a height of **760-900 mm**.
2. **Entrance Doorways:** Ensure a minimum clear opening of **900 mm** for doorways. Install automatic or easy-to-open doors where feasible.

### B. Corridors and Passageways

1. **Width:** Corridors should have a minimum width of **1500 mm** to allow for wheelchair movability.
2. **Clear Space:** Provide clear space in front of doors and other elements to allow easy turning for wheelchair users.
3. **Signage:** Clear, visible signage should be installed at appropriate heights.

### C. Accessible Washrooms

1. **Size:** The washroom should have a clear dimension of **2200 mm x 2000 mm** to accommodate wheelchair users.
2. **Grab Bars:** Install horizontal and vertical grab bars around the toilet seat and wash basin at heights of **750-850 mm**.
3. **Low Fixtures:** Washbasins, mirrors, and dispensers should be placed at a reachable height for people in wheelchairs (around **750-800 mm**).
4. **Doorway Width:** The washroom entrance door should have a clear opening of **900 mm**.

### D. Staircases and Lifts

1. **Staircase:** Installation of handrails on both sides. Ensure step height is uniform.
2. **Elevators:** Provide another elevator with a minimum clear door width of **900 mm**. Control panels should be positioned at an accessible height of **900-1200 mm**.

### E. Signage and Wayfinding

1. **Clear Signage:** Place directional signage at accessible heights and include audio systems where possible.
2. **Floor Number Indicators:** Provide both auditory announcements and signages on each floor.

### F. Parking

1. **Accessible Parking:** Designate accessible parking spaces near the building entrance, with at least **3600 mm** width to allow for wheelchair movement.
2. **Slope:** Ensure the parking space has a slope not greater than **1:20**.
3. **Signage:** Mark these spaces with clear signage.

### G. Auditory and Visual Aids

1. **Auditory Alarms:** Install alarms with both audible and visual signals (flashing lights) to assist people.

#### H. Accessible Furniture

1. Ensure seating areas, counters, and reception desks are at heights and configurations accessible for wheelchair users.

#### I. Emergency Evacuation

1. **Emergency Routes:** Provide clear, accessible evacuation routes with ramps, handrails, and wide corridors.
2. **Refuge Areas:** Designate areas of refuge for people with disabilities on each floor, with communication facilities for emergency services.

These retrofitting measures align with the **NBC 2016 Part 3**, which addresses "Development Control Regulations and Building Services," and the Harmonized Guidelines for creating barrier-free environments in both public and private buildings.

#### CONCLUSION

Since all three schools are not accessible, it is an eye-opening situation and makes us aware of the accessibility importance for inclusivity and well-being of students. We as architects, need to contribute while designing and retrofitting built structures to make them accessible for wheelchair users and differently-abled people.

The purpose of this study was to evaluate the condition of universal accessibility in Pune schools, with an emphasis on user experiences and accessibility features' usefulness. The study's findings emphasize the necessity of building inclusive educational settings in which kids with all abilities may participate and succeed. Schools play an important role in developing children's intellectual, social, and emotional well-being, and no kid should be denied this chance. Inclusive education, which is guided by the ideals of fairness, diversity, and accessibility, attempts to remove barriers and encourage participation for all students, including those with various abilities. Furthermore, in order to meet changing accessibility requirements, facilities must be evaluated and upgraded on a regular basis. Simple but effective improvements like ramps, accessible restrooms, tactile indications, and assistive devices may dramatically improve the usability of school environments. More crucially, the emphasis should be on flexibility, ensuring that the educational environment can respond to all learners' changing requirements throughout time.

The study indicates that achieving universal accessibility in schools is a continual effort that requires transforming mindsets and cultivating an inclusive culture. Schools must acknowledge that accessibility is a right, not a privilege, and work to establish environments in which every kid feels welcome, respected, and capable of success. Policymakers

must also take an active role in supporting inclusive education by creating clear standards and providing incentives for institutions that prioritize accessibility. To summarize, universal accessibility in schools is an important step toward creating a more fair and inclusive society. By ensuring that all kids, regardless of ability, have access to education, we not only protect their right to study, but also foster a more compassionate and inclusive community. The findings of this study provide a basis for future work to improve accessibility in educational settings, paving the path for a brighter and more inclusive future for all learners.

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