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ASSESSING INTERIOR DESIGN ASPECTS OF A CLASSROOM AND PROPOSING SUITABLE DESIGN FOR SELECTED MUNICIPAL SCHOOLS OF VADODARA CITY

APRIL 2025   **TISHA MISTRY**

ASSESSING INTERIOR DESIGN ASPECTS OF A CLASSROOM AND PROPOSING SUITABLE DESIGN FOR SELECTED MUNICIPAL SCHOOLS OF VADODARA CITY

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By

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DEDICATED TO
MY FAMILY,
GUIDE, FRIENDS

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ETHICAL COMPLIANCE DERTIFICATE

Institutional Ethics Committee for Human Research (IECHR)

FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

Ethical Compliance Certificate 2024-2025

This is to certify <u>Ms. Tisha Mistry</u> study titled; <u>"Assessing Interior Design Aspects of a Classroom and Proposing Suitable Design for Selected Municipal Schools of Vadodara City."</u> from Department of Family and Community Resource Management has been approved by the Institutional Ethics Committee for Human Research (IECHR), Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda. The study has been allotted the ethical approval number <u>IECHR/FCSc/M.Sc./10/2024/21.</u>

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CERTIFICATE

This is to certify that the thesis entitled **"ASSESSING INTERIOR DESIGN ASPECTS OF A CLASSROOM AND PROPOSING SUITABLE DESIGN FOR SELECTED MUNICIPAL SCHOOLS OF VADODARA CITY"** submitted for partial fulfilment of the requirement for the degree of Masters in the Faculty of Family and Community Sciences (Family and Community Resource Management) to the Maharaja Sayajirao University of Baroda, carried out by **Ms. Tisha Mistry**, is her original bonafide work.

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INTRODUCTION

CHAPTER I

INTRODUCTION

Learning spaces play a crucial role in shaping the educational experience for students and educators alike. Beyond merely serving as physical environments for instruction, they should serve as dynamic hubs that foster engagement, collaboration, and creativity. These spaces need to be inclusive, accommodating the diverse needs and preferences of both students and educators, ensuring that everyone feels valued and supported in their learning journey. Moreover, a well-designed learning space should evoke a sense of belonging, comfort, and safety, providing a nurturing environment where effective teaching and learning can take place. (Woolner, 2010)

Learning spaces should also be adaptable, allowing for flexibility in teaching methodologies and learning styles. A well-structured classroom should incorporate elements such as ergonomic furniture, optimal lighting, and technological integration to enhance the overall learning experience. Research suggests that thoughtfully designed educational environments can positively impact student engagement, motivation, and cognitive development (Smith & Taylor, 2023). By integrating modern pedagogical approaches with functional and aesthetically pleasing design, learning spaces can support a more interactive and student-centered education system.

1.1 Current Scenario of Interior Design in Municipal Schools

Municipal classrooms, particularly in resource-constrained regions, face numerous challenges due to inadequate infrastructure and poor interior design. Overcrowding remains a persistent issue, making it difficult for students to concentrate and for teachers to provide effective instruction (Ahmed G, 2020). Insufficient lighting, both natural and artificial, often leads to eye strain and reduced attention spans, while poor acoustics and excessive noise disrupt learning. Ventilation is another major concern, with classrooms lacking proper air circulation, resulting in discomfort and potential health issues.

The furniture in these classrooms is typically outdated, uncomfortable, and not ergonomically designed, causing physical strain for students and teachers alike. Flooring

is often made of worn-out concrete or tiles that are difficult to maintain and uncomfortable for prolonged use. Ceilings may feature exposed wiring, inadequate lighting, and poor acoustic treatment, further contributing to distractions. Walls are usually plain, with peeling paint and a lack of engaging educational displays or color schemes that could enhance the learning environment. Doors and windows are often inefficient in providing proper ventilation, insulation, and noise control, making the classrooms less conducive to focused learning.

Overall, the lack of thoughtful interior design in municipal classrooms affects student engagement, teaching effectiveness, and overall learning outcomes. Addressing these problems through improved spatial planning, ergonomic furniture, better lighting, proper ventilation, and visually stimulating walls can significantly enhance the educational experience.

These deficiencies create an environment that impedes effective learning, impacting students' educational outcomes and well-being.

1.2 Significance of Interior Space Design

Interior space design plays a crucial role in enhancing student engagement within educational settings. By carefully considering design elements such as shape of classroom, size of classroom, surface treatment used on ceiling, wall & floor, furniture layout, type of furniture, adequate lighting, indoor air quality, colours, schools can create welcoming environments that support effective learning for the students.[1]

The elements of interior design of a classroom significantly impacts both students and teachers, influencing their comfort, engagement, and overall effectiveness in the educational process. Comfort and well-being in the classroom of a school are enhanced through the use of ergonomic furniture, such as properly designed desks and chairs, which prevent discomfort and long-term health issues, promoting better posture and concentration. Engagement and focus are supported by adequate natural and artificial lighting, which enhances visibility, reduces eye strain, and improves mood and energy levels. Good acoustics minimize noise disruptions, allowing students to hear and engage more effectively during lessons. Color schemes also play a role, with calming colors like

blues and greens promoting relaxation and focus, while vibrant colors can stimulate creativity and energy. Accessibility and inclusion are addressed through accessible design features like ramps, adjustable desks, and clear pathways, ensuring that students with disabilities can participate fully in classroom activities. Technology integration is vital, as incorporating digital tools such as interactive whiteboards, projectors, and computers supports modern teaching methods and engages digital-native students. Together, these elements create a conducive learning atmosphere that enhances comfort, well-being, engagement, and educational outcomes.

1.3 Importance of Interior Design Elements in a Classroom

The character of a classroom space goes beyond its physical dimensions; it embodies a multifaceted blend of elements that collectively influence the atmosphere and environment in which teaching and learning take place. One of the key aspects contributing to this character is the physical layout, which includes the arrangement of desks, seating areas, and interactive zones. A well-designed layout can facilitate smooth traffic flow, encourage interaction among students, and create a conducive environment for collaborative learning.[2]

Ambiance is another critical component of a classroom's character, encompassing factors such as lighting, color scheme, and decor. The lighting in a classroom can impact mood, focus, and productivity, with natural light often preferred for its positive effects on well-being. Additionally, the color scheme chosen for the walls, furniture, and decor can influence emotions and cognitive processes, with warmer tones promoting comfort and cooler tones fostering concentration (Shishegar and Boubekri, 2016)

The strategic placement of doors and windows in classroom interiors is crucial for optimizing natural light, ventilation, and spatial flow. Well-positioned windows provide ample natural light, which can improve mood and concentration for both students and teachers. Proper door placement ensures smooth movement and accessibility, reducing disruptions during class. Additionally, good ventilation from well-placed windows can enhance air quality, contributing to a healthier and more comfortable learning environment.[3]

Furniture arrangement plays a significant role in shaping the character of a classroom space. Ergonomically designed furniture that supports proper posture and movement can enhance comfort and productivity, while versatile seating options can accommodate different learning activities and preferences. Overall design elements, including the use of textures, patterns, and decorative accents, further contribute to the overall ambiance and character of the space (Spray, 2023).

The design of classroom ceilings, walls, and floors plays a crucial role in shaping students' learning experiences. Higher ceilings can create a spacious and comfortable atmosphere, while proper acoustic treatments ensure clarity during lessons. Wall colors and textures influence mood and concentration, with calming tones promoting focus and interactive displays enhancing engagement. Durable and safe flooring materials contribute to a secure environment, while sound-absorbing options reduce distractions. By carefully considering these design elements, educators can create classrooms that are visually appealing, comfortable, and conducive to effective learning.

A window in front of the projector, can cause visibility issues as the screen it might be difficult for students to see due to glare or excessive light. It's essential to consider window placement and use appropriate window treatments to minimize glare and optimize visibility on the screen for students (Boubekri, 2009).

In classroom spaces, several issues may arise concerning various design components. Problems with placement or arrangement of furniture, equipment, or digital components can disturb the flow of the classroom and obstruct teaching and learning activities. Insufficient or excessive quantities of resources may lead to overcrowding or inadequate access. Inappropriately sized items can cause discomfort or obstruction. Poor quality building materials may compromise functionality and aesthetics. Complex technology or furniture can hinder usability. Lack of accessibility features may exclude students with disabilities. Safety hazards, such as inadequate lighting or unstable furniture, pose risks to well-being. Neglected maintenance detracts from functionality and appeal. Unattractive design elements diminish motivation and engagement. Addressing these challenges requires careful assessment and implementation of appropriate design solutions to optimize

functionality, safety, accessibility, and aesthetics & comfort ultimately enhancing the teaching and learning experience for all stakeholders.

In today's rapidly evolving educational landscape, the design of classroom has emerged as a pivotal factor in shaping the learning experiences of students. Every aspect of classroom design should be meticulously crafted to foster an environment conducive to learning and innovation. Interior design elements directly impact student mood, efficiency, and overall well-being. As educators increasingly embrace modern pedagogical approaches and technology-enhanced learning tools, the role of classroom design becomes paramount in facilitating collaboration, engagement, and personalized instruction.

In addition to technology integration, classroom design prioritizes flexibility and adaptability to accommodate diverse teaching methods and learning styles. Modular furniture arrangements, movable partitions, and versatile seating options allow educators to quickly reconfigure the space to suit different instructional activities, group sizes, and collaborative projects. This adaptability fosters a dynamic and interactive learning environment where students can comfortably collaborate, communicate, and explore ideas.[4]

Classroom design incorporates elements that promote student comfort, well-being, and productivity. Thoughtful consideration should be given to lighting conditions, acoustics, air quality, and ergonomic furniture to create a conducive learning atmosphere. For example, adjustable lighting systems with natural daylight simulation help regulate mood and concentration levels, while proper acoustic treatments minimize distractions and enhance auditory clarity during lectures and discussions. Calming colors, such as blues and greens, promote concentration and relaxation, while brighter hues can foster creativity and energy.[5]

By assessing the current state of municipal classroom design and identifying key areas for improvement, the present study aims to highlight effective interior design aspects that can enhance classroom environments. This research will focus on optimizing space utilization, colours. improving lighting and acoustics, incorporating furniture & furnishings, and integrating modern technology. will offer a roadmap for policymakers and educators to

create more conducive and inclusive educational settings, ultimately fostering better academic outcomes and well-being for students and teachers.

The design of classroom represents a holistic approach to education, where technology, pedagogy, and environment converge to create immersive and interactive learning experiences. By embracing innovation and forward-thinking design principles, educational institutions can effectively prepare students for success in the digital age while fostering creativity, critical thinking, and collaboration.

Overall, thoughtful interior design aspects that prioritize functionality, comfort, and aesthetics that can contribute to a positive learning environment, enhancing students' motivation, engagement, and academic achievement.

Justification

Interior design plays a significant role in enhancing the aesthetics, functionality, and comfort of a space. Whether it's a classroom, office, or home, well-designed interiors can have a positive impact on the occupants who utilize the space. In classroom spaces, problems may arise with placement, quantity, size, material, usability, accessibility, safety, maintenance, and aesthetics, affecting the overall learning environment. These challenges require careful consideration and targeted solutions to optimize teaching and learning experiences.

Interior design is the art of arranging and adjusting different elements to create a pleasing space. These elements include space, which involves how rooms are organized and utilized, color, which influences mood and emotion, lighting, which affects visibility and comfort, texture, which adds depth and richness, and patterns, which add visual interest and movement. In classrooms, these elements play a crucial role in creating environments that are both functional and inviting for students and teachers alike.[9]

Interior design relies on foundational principles that guide the arrangement and composition of classroom spaces. These principles include balance, which ensures an even distribution of visual weight within the room, achieved through symmetrical, asymmetrical, or radial arrangements. Proportion and scale dictate the sizing and relationship of objects to prevent them from overpowering or underwhelming the space.

Rhythm is created through the repetition of elements like colors, patterns, or shapes, adding movement and interest. Contrast brings visual impact by contrasting different elements, highlighting focal points and creating depth. Lastly, unity harmonizes all design elements to ensure they work together seamlessly, resulting in a cohesive and inviting classroom environment.[6]

Creating a well-designed classroom goes beyond just aesthetics which includes ensuring functionality by arranging furniture effectively and planning for smooth traffic flow. Ergonomics plays a role in maximizing comfort and efficiency, achieved through thoughtful furniture selection and seating arrangements. Safety and accessibility are paramount, requiring proper lighting, and hazard-free environments. incorporating flexible furniture and modular layouts, colours, ceiling height, walls & floor textures, lighting aspects (natural and artificial), placements of doors and windows, occupancy or classroom according to size of rooms allows for easy adaptation to different learning activities and promotes collaboration among students.[7]

In municipal schools, teachers and students often encounter a variety of problems related to different interior design aspects of classroom design. Irregularly shaped classrooms can make it difficult to arrange furniture effectively, causing problems with visibility and accessibility. Classroom might have blind spots where students can't see the board clearly. Small classrooms can lead to overcrowding, reducing the space available for movement and interactive activities, while excessively large classrooms may lead to difficulties in managing and engaging all students effectively. Overcrowded classrooms with more students than the space is designed for can create a noisy, chaotic environment that hinders both teaching and learning. Poor surface treatments, such as reflective surfaces or hard floors, can cause noise to bounce around the room, creating a loud and distracting environment. Non-ergonomic furniture made from low-quality materials can be uncomfortable and cause physical strain, such as hard plastic chairs without proper back support. Inefficient furniture arrangements can disrupt the flow of the classroom, making it difficult for students to focus and for teachers to move around. Inadequate furnishings, such as a lack of storage space or absence of soft seating areas, can limit the functionality of the classroom. the color of walls and furniture can greatly impact the learning

environment. Dull or overly bright wall colors can distract students or create a depressing atmosphere, while bright red walls may overstimulate them, and dark colors can make the room feel smaller and uninviting. Mismatched or harsh-colored furniture can cause visual chaos and discomfort, making it hard for students to focus. Old or poorly maintained furniture can also be uncomfortable and fail to support ergonomic needs, leading to physical discomfort and distraction. Poor lighting can strain eyes and reduce concentration, with insufficient natural light or overly harsh artificial lighting negatively impacting mood and energy levels. Improper placement of doors and windows can lead to problems with ventilation, natural light, and noise. Ineffective placement of projectors, interactive whiteboards, and computers, can hinder their use and accessibility. the lack of accessibility features, such as ramps or wide doorways, can exclude students with disabilities from fully participating in classroom activities. Overall, these problems highlight the need for thoughtful interior design that considers the specific needs of both teachers and students in municipal schools. Addressing these problems can create a more conducive and effective learning environment.

Several studies have been conducted such as Classrooms Interior Design in Creating a Creativity Supportive Environment, Light Colour Temperatures on Interior Design Student Performance, The Role of the Interior Designer in the Autistic Classroom, Classroom Interior Design on the Happiness and Mental Health of the Female Adolescent Students, Interior design considerations to enhance student satisfaction, Classroom Design Impacts Student, Classroom interior of high schools, Impact of Happiness Classes on the Students Studying in Schools of the Municipal Corporation, Universal Design for Learning. However, there is a dearth of research specifically focusing on the assessing interior design aspects in classroom of selected Municipal Schools of Vadodara city hence the present study was undertaken.

The Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, offers courses on "Interior Design & Furnishings", "Commercial Space Design", And "Services & Cost Estimation in Interior Design" at Bachelor's level as well as Master's level. Hence, the

information gathered through the present research would widen the database and will help in enhancing the curriculum.

The findings of the study will be fruitful to the students of interior designing, architecture, as well as schools of designing as they will be able to provide comprehensive analysis by proposing innovative design solution in various classrooms in institutions, considering all the elements & principles of design.

By addressing these critical needs, research can pave the way for meaningful enhancements in municipal school classrooms, ensuring that all have access to a quality education in a well-equipped and conducive environment. This underscores the importance of investing time and resources into understanding and resolving the infrastructural and interior design challenges faced by these educational institutions.

Additionally, the research findings will serve as a valuable resource for stakeholders, namely educators and policymakers, in designing future educational policies and practices. It will also recommend student-centric designs that consider all interior design elements for the classrooms of selected municipal schools in Vadodara city.

Statement of the problem

The present study aims to assess interior design aspects of a classroom and proposing suitable design for selected municipal schools of Vadodara city.

Objectives

1. To assess the interior design aspects of classroom in selected Municipal Schools of Vadodara city.
2. To identify extent of problems faced by school teachers with regards to aspects of interior design in classroom of selected Municipal Schools of Vadodara city.
3. To assess the opinion of school teachers regarding existing interior design aspects in the classroom of selected Municipal Schools of Vadodara city.
4. To propose suitable design of the classroom taking into consideration all interior design aspects.

Delimitations

1. This study is limited to selected Municipal Schools of Vadodara city.
2. The study will be limited to Gujarati medium Primary Municipal Schools of Vadodara city.
3. The study will be limited to 5 primary classrooms from 5 different Municipal Schools of Vadodara city.
4. The study will be limited to those teachers who are working in the school for more than 5 years.

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

The literature review is a fundamental component of any research endeavor, providing a comprehensive overview of previous work conducted by established scholars and researchers on related topics. This section serves as a distilled summary of an extensive survey of existing technical literature, drawing from journals, articles, books, research papers, and other relevant sources. Through this process, the researcher gains insight into both the explored and unexplored areas of the subject, identifying gaps and opportunities for further investigation. It also familiarizes the researcher with the specific domain of interest, guiding the study's direction. In the present chapter, the literature review is meticulously organized into two distinct sections:

2.1 Theoretical orientation

> 2.1.1 Interior Design in Educational Settings

> 2.1.2 Significance of interior design in Classroom

> 2.1.3 Need for Interior Design in Classroom

> 2.1.4 Key Aspects of Interior Design in Classroom

> 2.1.5 Digital Infrastructure Used in Classrooms

> 2.1.6 Essential Requirements in Interior Design for Classrooms

2.2 Empirical studies

> 2.2.1 Research Studies Conducted in India

> 2.2.2 Research Studies Conducted Outside India

2.3 Conclusion

2.1 Theoretical Orientation

2.1.1 Interior Design in Educational Settings

Education is a vital aspect of society, and the built environment plays a crucial role in shaping effective and engaging learning spaces. Interior design in educational settings involves the careful planning, design, and execution of interior spaces within schools, colleges, and universities. The primary goal is to create environments that foster learning, teaching, and collaboration (Spector et al., 2023). Current trends in educational interior design emphasize flexibility, adaptability, and technological integration. This is evident in the increasing use of open-plan layouts, movable furniture, and smart technology. Additionally, there is a growing emphasis on sustainability, with designers incorporating biophilic elements to establish a connection with nature.[8]

Several common interior design aspects are now prevalent in educational settings. The use of natural light is one such aspect, with schools being designed to include large windows and skylights, as natural light has been proven to enhance student mood and cognitive function. Another important aspect is flexible furniture, which can be easily rearranged to suit various learning activities and group sizes (Woodley, 2019). Smart technology, such as interactive whiteboards and tablets, is also being integrated into classrooms to enrich the learning experience. Biophilic design is increasingly adopted, bringing nature indoors through the use of plants, greenery, and natural materials, thereby creating a calming and inspiring environment. The use of sustainable materials, like recycled wood and low-VOC paints, reflects a growing commitment to reducing environmental impact in educational spaces (Morley, 2024).

2.1.2 Significance of Interior Design Aspects in a Classroom

The design and layout of a classroom play a significant role in creating an effective learning environment. The shape of the classroom can influence acoustics, lighting, and airflow. While rectangular classrooms are the most common, alternative shapes like circular or hexagonal can also be utilized to enhance these elements. The size of the classroom should be proportionate to the number of students, as a space that

is too small can be uncomfortable, while a space that is too large can be challenging to manage. The occupancy, or the number of students the classroom is designed to hold, should be based on the students' age and grade level to ensure a conducive learning atmosphere (Barrett et al., 2019)

Surface treatments used on ceilings, walls, and floors significantly impact the classroom's acoustics, lighting, and thermal comfort. Light colors are often chosen to create a brighter and more cheerful environment, while darker shades can help absorb sound. The type of furniture selected should be comfortable, durable, and appropriate for the students' age and grade level, with sturdy base materials that are easy to clean. The arrangement of furniture can affect traffic flow, acoustics, and student engagement; while traditional rows of desks facing the teacher are still common, alternative layouts like small group tables or U-shaped arrangements are also effective.

Furnishings, such as rugs, curtains, and plants, contribute to a more inviting and comfortable classroom. The choice of color is crucial as well, with light tones promoting a bright and cheerful space, while darker hues can create a calming and focused atmosphere. Adequate lighting, both natural and artificial, is essential for a productive learning environment. Maximizing natural light is ideal, but artificial lighting should be in place to supplement it, especially during evening hours. The placement of doors and windows is also critical for ensuring proper ventilation and natural light, with doors conveniently located and windows positioned to provide outdoor views.[9]

With the growing integration of ICT components like computers, projectors, and interactive whiteboards in classrooms, it's important that these tools are easily accessible and placed in user-friendly locations. Lastly, accessibility is key; classrooms should be designed to accommodate all students, including those with disabilities. Features such as ramps and elevators ensure that every student can access and utilize the classroom space effectively.[10]

2.1.3 Need for Interior Design in Classrooms

The need for effective interior design in classroom is particularly pressing for municipal schools in Vadodara, given their current challenges. Many of these school's face problems with outdated infrastructure, inadequate space, and poor environmental conditions. A well thought out design can significantly enhance the learning environment by addressing these problems and creating a more conducive space for students.

The design of classroom interiors is crucial in making these spaces more comfortable and welcoming. Many municipal schools have classrooms that are either too cramped or poorly lit, which can affect students' concentration and overall comfort. By incorporating elements such as better lighting, comfortable seating, and vibrant colors, these classrooms can become more inviting and engaging. This improvement can help students feel more at ease and motivated to learn (Oruikor, 2023).

Integrating modern technology into classroom designs is essential. With the increasing importance of digital learning tools, classrooms need to accommodate various ICT components like computers and interactive whiteboards. For municipal schools, this means designing spaces that can effectively support these technologies without causing clutter or disrupting the learning environment. Ensuring that classrooms are equipped with the necessary infrastructure for technology can enhance educational experiences and make learning more interactive and effective.[11]

Accessibility is a critical aspect of classroom design, especially in municipal schools where resources are often limited. Designing classrooms to be accessible for all students, including those with disabilities, is vital for creating an inclusive learning environment. This includes features like ramps, adjustable furniture, and clear, unobstructed pathways. Addressing these needs can help ensure that every student has equal access to educational opportunities, promoting a more equitable and supportive school environment. [11]

2.1.4 Key Aspects of Interior Design in Classrooms

WALL

Walls serve as a crucial element in defining the character and functionality of any space. In a classroom, their purpose extends beyond merely providing structural support. They contribute significantly to the acoustics, thermal insulation, and overall environment, acting as barriers that separate the learning space from external distractions, thus maintaining a focused and secure atmosphere (Barrett et al., 2019). Additionally, walls offer surfaces for color, texture, and decoration, influencing the room's ambiance and utility. They can be used for educational displays, whiteboards, and storage solutions, enhancing functionality (*Designing Quality Learning Spaces*, 2007). The materials and finishes chosen for walls directly impact the classroom's aesthetics, comfort, and durability, making them a key element in interior design.

Material Used for Walls

Bricks: Bricks are a durable, fire-resistant building material made from clay or shale, offering excellent thermal mass and sound insulation. They are commonly used for structural and non-structural walls, including facades and partitions, providing a sturdy and traditional finish. [12]

Concrete: Concrete is a strong, durable material made from a mix of cement, sand, gravel, and water. Ideal for structural walls, it offers high strength, fire resistance, and design flexibility, although it can be cold and requires proper insulation. [5]

Wood: Wood adds warmth and aesthetic appeal to walls, used in paneling, cladding, and structural frames. It offers natural insulation and can be finished in various styles but needs protection from moisture, insects, and fire. [12]

Glass: Glass, being transparent or translucent, maximizes natural light and offers modern, sleek aesthetics. Commonly used in windows and partitions, it enhances openness but may require additional treatments for privacy, UV protection, and thermal insulation. [12]

Applied Finishes on Walls

Paint: Paint is a versatile, cost-effective finish available in various colors, finishes, and types. It enhances aesthetics and can offer some protection but may require regular maintenance and touch-ups depending on quality and application.[13]

Wallpaper: Wallpaper adds texture and pattern to walls and comes in materials like paper, vinyl, and fabric. It's decorative and covers imperfections but can be labor-intensive to install and remove, and its durability depends on the room's conditions.[13]

Plaster: Plaster, made from lime, gypsum, or cement with sand and water, provides a durable, customizable finish with various textures. It's classic and robust but requires skilled application and can be more expensive and prone to cracking. [13]

Tiles: Tiles, including ceramic, porcelain, and natural stone, are durable, water-resistant, and ideal for high-moisture areas. They offer a wide range of designs but require labor-intensive installation and maintenance of grout lines. [13]

Care and Maintenance for Walls

Classroom walls involve regular inspection and upkeep to ensure their durability, functionality, and aesthetic appeal. For brick walls, periodic checks for cracks and mortar degradation are essential, with repairs conducted promptly to maintain structural integrity. Concrete walls require similar vigilance, focusing on sealing any cracks and ensuring proper insulation to avoid coldness and dampness. Wooden walls should be treated against moisture, insects, and fire, with refinishing as needed to preserve their appearance and strength. Glass surfaces should be cleaned regularly and inspected for cracks or chips, with treatments applied to maintain thermal efficiency and privacy. Applied finishes like paint, wallpaper, plaster, and tiles need appropriate cleaning methods, touch-ups, or replacements, depending on their condition and the specific demands of the classroom environment. Regular maintenance not only extends the lifespan of these materials but also ensures a conducive learning atmosphere (Norazman, 2019).

FLOOR

The purpose of the floor is to provide a stable, durable, and safe surface for walking, standing, and placing furniture. Floors contribute to the overall aesthetics of a space, help control noise levels, and can influence comfort through their materials and finishes. Floors play a key role in defining the functionality of a room, whether for residential, commercial, or educational purposes. They provide a level surface for movement, ensuring safety and comfort for occupants. In addition to their practical functions, floors contribute significantly to the room's overall design, influencing its visual appeal through material choices, colors, and textures. Floors can also impact acoustics by absorbing or reflecting sound, and they play a role in temperature regulation by providing thermal insulation. Depending on the material, floors can be easy to maintain, resistant to wear, and capable of handling various types of foot traffic.[14]

Covering Used on Floor

Tiles: Tiles, including ceramic, porcelain, and natural stone, are durable and water-resistant, making them ideal for high-traffic areas and spaces prone to moisture. They are easy to clean and come in various styles and patterns, though installation can be labor-intensive, and grout lines require maintenance (Heisterberg-Moutsis, 2017).

Vinyl: Vinyl flooring is a versatile and cost-effective option available in sheets, tiles, or planks. It is resilient, water-resistant, and comes in various designs mimicking natural materials. It's suitable for both residential and commercial settings, offering ease of maintenance but may not be as durable as other materials(Heisterberg-Moutsis, 2017).

Wood: Wood flooring, including solid and engineered varieties, adds warmth and elegance to interiors. It is durable and can be refinished, but it requires regular maintenance and can be susceptible to moisture damage if not properly sealed (Heisterberg-Moutsis, 2017).

Carpet: Carpet provides comfort and insulation, available in various textures and colors. It helps with sound absorption and adds warmth, but it can be challenging to clean and may require regular vacuuming and professional cleaning to maintain appearance and hygiene(Heisterberg-Moutsis, 2017).

Concrete: Concrete floors are durable and versati8le, often used in industrial and modern designs. They can be stained or polished for aesthetic appeal and are resistant to wear and tear, though they may need additional finishing for comfort and insulation(Heisterberg-Moutsis, 2017).

Stone: Stone flooring, such as marble or granite, provides a durable and easy-to-clean surface for classrooms. It is resistant to wear and tear, which makes it a long-lasting choice for high-traffic areas. However, stone floors can be cold and hard, which may affect comfort. Adding rugs or mats can help improve warmth and cushioning. Proper maintenance is also essential to keep the stone clean and polished, ensuring a pleasant learning environment. Stone flooring's natural look can also enhance the classroom's aesthetic appeal, making it a visually appealing option(Heisterberg-Moutsis, 2017).

Care and Maintenance for Floor

Classroom floors depend on the type of covering used but generally involve regular cleaning and inspections to ensure longevity and safety. For tile floors, routine sweeping and mopping keep them clean, while grout lines should be sealed and maintained to prevent dirt buildup and staining. Vinyl floors require regular sweeping and occasional mopping with a mild cleaner, avoiding harsh chemicals that can damage the surface. Wood floors need periodic sweeping, dusting, and refinishing to protect against scratches and moisture, while spills should be promptly cleaned to avoid water damage. Carpets should be vacuumed frequently to remove dirt and allergens, with professional deep cleaning scheduled periodically to maintain hygiene and appearance. Concrete floors, while highly durable, benefit from regular sweeping and occasional sealing or polishing to prevent surface wear and enhance their look. Consistent care ensures that all types of flooring remain safe, functional, and visually appealing over time.[15]

CEILING

Ceilings serve several important purposes in a room. Aesthetically, they enhance the overall visual appeal of the space, offering opportunities for creative design elements and finishes. Structurally, ceilings conceal essential components like beams, ductwork, and wiring, presenting a clean and polished appearance. They also play a crucial role in acoustic control, helping to manage sound quality by reducing noise and echo through materials designed for sound absorption. Additionally, ceilings contribute to thermal insulation, aiding in temperature regulation and potentially reducing energy costs. They also provide a surface for integrating lighting fixtures, including recessed lights and chandeliers, which enhances both illumination and ambiance (Zhang,2024).

Material Used for Ceiling

Gypsum Board (Drywall): Gypsum board is a common ceiling material made from a core of gypsum plaster sandwiched between two layers of paper. It's versatile and easy to install, allowing for smooth, painted surfaces or textured finishes. It provides good fire resistance and can be used for acoustic treatments. However, it can be susceptible to water damage if not properly sealed.[16]

Plaster: Plaster ceilings are traditional and can be finished smooth or with decorative textures. They offer a robust and classic appearance and can help with sound insulation. Plaster requires skilled labor for application and proper curing and can be prone to cracking if not applied correctly. [16]

Metal: Metal ceilings, including aluminum or steel tiles, provide a modern, sleek look and are highly durable. They are resistant to moisture and easy to clean, making them suitable for commercial and industrial spaces. Metal ceilings can be more expensive and may require special installation techniques. [16]

Wood: Wood ceilings add warmth and character to a space, available in various finishes such as solid wood panels or engineered wood products. They provide natural insulation and aesthetic appeal but require maintenance to prevent moisture damage and can be more costly. [16]

Acoustic Tiles: Acoustic tiles are designed to improve sound quality by reducing noise levels and are often used in environments where sound control is important. Made from materials like fiberglass or mineral wool, they are effective in absorbing sound but may require regular maintenance and can have a more utilitarian appearance. [16]

Suspended (Drop) Ceilings: Suspended ceilings consist of a grid system that holds removable ceiling tiles. They are often used in commercial spaces for easy access to utilities and can incorporate acoustic tiles or other materials for sound control. They offer flexibility but may not be suitable for residential applications where aesthetics is a priority. [16]

Care and Maintenance for Ceiling

Ceilings vary depending on the materials used but generally involve regular inspections and cleaning to preserve their appearance and functionality. For gypsum board ceilings, routine dusting and cleaning with a damp cloth help maintain their surface, while checking for cracks or water damage is essential to prevent deterioration. Plaster ceilings require similar cleaning methods, with periodic inspections for cracks or peeling, which can be repaired with patching or repainting. Metal ceilings benefit from regular dusting and occasional wiping with a mild cleaner to prevent corrosion, while ensuring proper ventilation to avoid moisture buildup is crucial. Wood ceilings need careful dusting and occasional refinishing or sealing to protect against moisture and insect damage. Acoustic tiles should be vacuumed or gently wiped to remove dust and debris, with replacements made if tiles become stained or damaged. Suspended ceilings require periodic checks to ensure tiles are properly aligned and intact, with any damaged tiles promptly replaced. Consistent care and timely repairs extend the life of ceilings and maintain their aesthetic and functional qualities. [17]

FURNITURE AND FURNISHINGS

The importance of school furniture cannot be overstated, as it significantly impacts student learning and engagement. Properly designed furniture enhances comfort,

promotes good posture, and provides essential support, all of which contribute to students' ability to focus and participate actively in class. According to UNESCO, lightweight and adjustable furniture, such as sit-stand desks and flexible seating options, can greatly improve student performance by accommodating various learning activities and styles. Additionally, ergonomic furniture reduces discomfort and back pain, which can otherwise distract from learning. Flexible, mobile, and adaptable furniture supports dynamic teaching methods and student interactions, fostering a productive learning environment. Investing in high-quality, versatile furniture ensures that classrooms can meet the diverse needs of students, enhancing their overall educational experience and facilitating better learning outcomes (Starkey,2021).

Material Used for Furniture

Wood: Wood is a classic material prized for its durability, warmth, and aesthetic appeal. It encompasses solid wood, plywood, and engineered wood products like MDF and particleboard. Wood is frequently used in the construction of desks, chairs, storage units, and cabinetry. Its natural insulation properties, ease of customization, and variety of finishes make it a versatile choice. Additionally, responsibly sourced wood supports sustainability. However, wood is susceptible to moisture and pest damage, necessitating regular maintenance and protective finishes (Reddy,2016).

Metal: Metal furniture, typically made from steel, aluminum, or wrought iron, is renowned for its strength and durability. It is commonly employed in the structural components of desks and chairs, as well as frames for shelves and storage units. Metal is valued for its robustness, resistance to wear and tear, and ease of cleaning. It can be powder-coated or painted for aesthetic versatility. On the downside, metal furniture can be heavy and cold, which may require added cushioning for comfort (Reddy,2016).

Plastic: Plastic materials, including polypropylene and polycarbonate, are lightweight and versatile. They are frequently used for chairs, desks, and storage solutions. Plastics are praised for their ease of cleaning, moisture resistance, and

affordability, and they come in a variety of colors and designs. However, plastic may not be as durable as wood or metal and may lack the same level of comfort (Reddy,2016).

Applied Finishes on Furniture

Paint: Paint provides a protective and decorative layer to furniture. Available in various colors and finishes (matte, satin, gloss), paint can transform the look of furniture. It is easy to apply and update, but the durability of the finish depends on the paint quality and preparation of the surface. Paint may chip or wear over time and require touch-ups (Reddy,2016).

Varnish: Varnish is a clear finish that provides a hard, protective coating. It enhances the natural color of the wood while offering protection against moisture, heat, and wear. Varnish is available in different sheens, from matte to high gloss. It can be applied over stains or natural wood but may require several coats for optimal protection (Reddy,2016).

Laminate: Laminate finishes involve applying a thin layer of plastic material to the surface of furniture. It provides a durable, low-maintenance finish that is resistant to scratches, stains, and moisture. Laminates come in various patterns and colors, including wood grain and solid colors. While they are durable and easy to clean, they can be difficult to repair if damaged (Reddy,2016).

Upholstery Used for Furniture

Fabric and upholstery used for furniture, such as polyester, nylon, leather, and various blends, are chosen for their comfort, durability, and aesthetic appeal. These materials are commonly applied to chairs, cushions, sofas, and other soft furnishings. Polyester and nylon are popular for their resistance to wear and fading, while leather offers a luxurious feel and high durability, though it requires specific care to avoid cracking and drying out. Various blends combine natural and synthetic fibers to balance comfort, resilience, and affordability. The textures, patterns, and colors of these materials can significantly enhance a room's visual and tactile appeal, making them a key component in interior design.[18]

Regular cleaning is essential to maintain the appearance and longevity of these materials. For fabric upholstery, vacuuming to remove dust and debris, spot cleaning with appropriate solutions, and professional deep cleaning are recommended. Leather requires conditioning to maintain its suppleness and prevent damage. Avoiding direct sunlight and excessive moisture is important to preserve the color and integrity of both fabric and leather. Despite their durability, upholstery materials are subject to wear and tear over time, so proper care is essential to extend their lifespan and keep furniture looking its best.[19]

INTERIOR ACCESSORIES/ DECORATIVE ELEMENTS

Interior accessories and decorative elements in a classroom play a vital role in creating an engaging and inspiring learning environment. Items such as artwork, educational posters, and plants not only enhance the visual appeal of the space but also contribute to the educational atmosphere. For example, educational posters and artwork can visually reinforce key concepts and inspire creativity, while plants add a touch of nature, improving air quality and creating a calming effect. Decorative items like wall clocks, bulletin boards, and shelves also add functional elements that support organization and learning. By thoughtfully incorporating these accessories, a classroom becomes more inviting, comfortable, and conducive to student engagement and focus (Terada, 2018).

LIGHTING

Lighting in classrooms is crucial for creating an environment conducive to learning and productivity. Commonly, classrooms use a combination of natural and artificial lighting to balance illumination throughout the day. Natural light, through windows and skylights, enhances mood and concentration, providing a pleasant and energizing atmosphere. However, due to variability in daylight, artificial lighting supplements this by ensuring consistent visibility. Common types of artificial lighting include fluorescent lights for broad, even illumination and LEDs for energy efficiency and adjustable brightness. Proper lighting design also involves

controlling glare and shadows to minimize distractions and support various learning activities.[20]

Natural Lighting

Natural light is derived from sunlight and is widely regarded for its positive effects on health and productivity. In classrooms, natural light enhances visual comfort, boosts mood, and supports circadian rhythms, which regulate sleep and alertness. Large windows and skylights are common features to maximize daylight exposure, which has been linked to improved student performance and engagement. However, relying solely on natural light can be impractical due to weather variations and limited daylight hours, necessitating supplementary artificial lighting (Haller,2017).

Artificial Lighting

Artificial lighting is used to supplement or replace natural light, ensuring consistent illumination throughout the day and in all weather conditions. It includes various types such as fluorescent, incandescent, and LED lights. Artificial lighting helps to maintain visibility and focus, especially in areas with inadequate natural light. It can be tailored to different activities and needs, with adjustable options available to control brightness and reduce glare. Despite its benefits, artificial lighting must be carefully managed to avoid potential drawbacks like eye strain or distractions caused by improper placement and flickering (Singh,2020)

FAN

Fans are essential for ensuring comfort and air circulation in classrooms, especially in warmer climates or during hot weather. They work by enhancing airflow, which helps regulate the temperature and prevent the classroom from becoming stuffy. This improved ventilation supports a more comfortable environment, aiding concentration and reducing fatigue among students and teachers. Ceiling fans provide consistent air movement throughout the room, while portable fans offer flexibility and targeted cooling. By maintaining a steady flow of air, fans can help manage humidity and improve overall air quality, contributing to a healthier and

more productive learning space. Proper installation and placement of fans are crucial for maximizing their effectiveness and ensuring that all areas of the classroom benefit from improved air circulation (Canalejo,2023).

DOORS

Doors play a crucial role in classrooms by providing access, security, and privacy. They ensure safe entry and exit points, contribute to effective classroom management, and help in controlling noise and maintaining a conducive learning environment. Classroom doors are designed to meet safety standards, with features such as locking mechanisms to secure the space and prevent unauthorized access. They also assist in controlling the flow of students between classrooms and corridors, supporting orderly transitions during school activities. Additionally, doors can influence the acoustics of a classroom by minimizing external noise and improving sound isolation, which is essential for maintaining focus and minimizing distractions. The choice of door material and design can impact both functionality and aesthetics, making it an important consideration in classroom design.[21]

WINDOWS

Windows in classrooms are vital for providing natural light, air circulation, and a connection to the outside environment. They enhance the learning experience by creating a bright and inviting atmosphere that can improve student mood and focus. Natural light from windows is known to have positive effects on student performance and well-being, contributing to higher achievement and engagement levels. Windows also allow for fresh air circulation, which is important for maintaining a healthy indoor climate and reducing stuffiness. However, the placement and size of windows need to be carefully considered to balance natural light with potential distractions and glare. Proper window treatments, such as blinds or shades, can help manage light levels and privacy, ensuring an optimal learning environment. [21]

VENTILATION

Ventilation is crucial in classrooms to ensure a healthy and conducive learning environment. Proper ventilation helps maintain air quality by reducing the concentration of indoor pollutants, controlling humidity, and providing a steady flow of fresh air. This contributes to students' overall well-being and cognitive performance, as poor air quality can lead to discomfort, fatigue, and decreased concentration. Effective ventilation systems, including natural ventilation through windows and mechanical systems such as HVAC units, can regulate temperature and humidity levels, preventing issues like mold growth and stuffiness. Ensuring adequate ventilation also supports better acoustics and minimizes the risk of airborne illnesses. [21]

2.1.5 Digital Infrastructure Used in Classrooms

DIGITAL INFRASTRUCTURE

Digital infrastructure is essential for fostering an engaging and interactive learning environment. Key elements include computers, projectors, interactive whiteboards, and smartboards, which are strategically positioned to ensure clear visibility and functionality. Computers are typically placed on desks or dedicated workstations to provide easy access for students, while projectors are mounted on the ceiling or a high wall to project images and videos onto a large screen or whiteboard, avoiding interference from natural light and glare. Interactive whiteboards and smartboards are usually positioned at the front of the classroom, allowing all students to view and participate in lessons. Proper placement of Wi-Fi access points is crucial to ensure consistent and reliable internet connectivity throughout the room. These digital tools are integrated to enhance collaboration and facilitate dynamic teaching methods, making the classroom a more effective and modern learning space.[22]

ELECTRICAL & TELECOMMUNICATION SERVICES

Electrical and telecommunication services are vital components of a well-functioning classroom, contributing to both operational efficiency and safety. Electrical outlets are strategically placed around the room to provide easy access

for various devices, such as computers, projectors, and other electronic equipment, while minimizing clutter and tripping hazards. Switchboards are typically located in accessible but discreet areas, allowing for efficient management of electrical circuits and ensuring safety. Audio systems, including microphones and speakers, are installed to ensure clear communication throughout the classroom, with careful consideration given to preventing feedback and distortion. Telecommunication services, such as telephones and intercom systems, are integrated to facilitate communication within the school and with external parties. Thoughtful placement and integration of these services are essential to maintain a functional and comfortable learning environment while supporting the effective use of technology and communication tools.[23]

2.1.6 Essential Requirements in Interior Design for Classrooms

FLEXIBLE LAYOUTS IN CLASSROOM

Flexible layouts in classroom design are crucial as they create adaptable spaces that support a range of teaching methods and activities. These layouts allow for easy reconfiguration of the classroom to accommodate different instructional approaches, such as group work, individual study, or hands-on projects. By incorporating movable furniture, modular seating, and versatile room arrangements, flexible layouts enhance collaboration among students and enable educators to modify the environment based on lesson objectives. This adaptability not only fosters active learning but also ensures that the classroom can evolve with changing educational needs, making it a dynamic and responsive space for both teachers and students.[4]

ADEQUATE VENTILATION IN CLASSROOM

Adequate ventilation is essential in classroom design to ensure a healthy learning environment. Proper airflow is important to maintain good air quality, reduce dust, and control humidity. Simple solutions like well-placed windows, ceiling fans, and basic ventilation systems help keep the classroom comfortable, improve

concentration, and prevent the spread of illnesses. Good ventilation supports a better learning atmosphere, making it crucial for effective classroom design. [3]

ADEQUATE LIGHTING IN CLASSROOM

Adequate lighting is crucial for effective classroom design, as it directly impacts students' ability to focus and learn. Natural light should be maximized through large windows or skylights, while artificial lighting should be evenly distributed to avoid glare or shadows. Proper lighting reduces eye strain, enhances visibility, and creates a welcoming environment. By ensuring sufficient light levels, classrooms can support students' well-being and improve their overall academic performance. [3]

CLASSROOM ACOUSTICS

Reducing noise in classrooms is important for helping students concentrate and learn effectively. To create a quieter environment, classrooms should use materials that absorb sound, like carpets or curtains, and ensure that furniture is arranged to minimize noise. Simple steps, such as closing windows to block outside noise and using soft materials on walls and floors, can also make a big difference. This helps students stay focused and improves their ability to learn, making the classroom a more comfortable place to study. [24]

OCCUPANCY COMFORT OF CLASSROOM

Effective classroom occupancy management is key to a comfortable learning environment. It involves ensuring there are not too many students in a room, providing ample personal space, and allowing for flexible movement. Proper lighting, ventilation, and noise control are essential for maintaining focus and comfort. The layout should also consider accessibility and accommodate various learning activities to create an effective teaching and learning space. The arrangement of furniture should be adaptable to different teaching methods and should support a range of activities, from group work to individual study. By balancing these factors, classrooms can foster a more engaging and productive educational experience. [25]

2.2 Empirical Studies

2.2.1 Research Studies Conducted in India

Dasgupta (2012) Conducted a study titled "An assessment of interiors of selected Anganwadis of Vadodara city" with the primary objective of evaluating the existing interior conditions of Anganwadis in Vadodara city. The research utilized a descriptive research design, selecting 20 Anganwadis from various parts of the city as samples. Although the sampling technique was not specified, the study involved direct observation and assessment of the interiors. Key findings revealed that most Anganwadis were housed in the homes of workers/helpers, with only one room, predominantly pucca structures, and minimal furnishings. Issues such as chipping paint, poor cross-ventilation, lack of furniture, and inadequate lighting were identified. The study concluded that improvements in the interior design of Anganwadis were essential to create a comfortable and stimulating environment for children, emphasizing the need for better flooring, furniture placement, storage, color schemes, and lighting to support children's development and learning.

Meenakshi and Sumangala (2015) Conducted research on "Classroom interior of high schools in Dharwad." The main objective was to assess the selected interior aspects in classrooms of high schools in Dharwad city. The study focused on school children's workplace design and dimensions, which play a major role in influencing their learning performance. A total sample of six high school classrooms was selected purposively for the study. The existing physical interiors were recorded and compared with BIS recommendations. The results revealed that classroom size, window size, and illumination levels on students' desktops were below the recommended BIS standards. Additionally, furniture dimensions such as bench height and desk height were found to be higher than the standard. The study concluded that there was a need to redesign the interiors of the classrooms for improved user comfort.

Lokhandwala and Kinariwala (2019) Conducted a study on "Assessing and Redesigning of Selected Autism Center from The Locale of Ahmedabad". The study aimed to design autism-friendly classrooms that promote development by

addressing the specific sensory needs of autistic children. A descriptive research design was used to collect data from two autism centers in Ahmedabad. The sample included children up to 21 years old. Data was gathered using an interview schedule and observation sheet to assess the existing interior spaces. The comparative analysis revealed design shortcomings in the centers, leading to recommendations for organized space planning, appropriate materials, colors, textures, lighting, and sound control. The findings emphasized the importance of sensitive interior considerations in enhancing the well-being and growth of autistic children.

Bandyopadhyay and George (2020) Conducted a study on "Interior design consideration to enhance student satisfaction in classroom" in Kerala, India. The main objective was to identify the interior design parameters for classroom design that enhanced student satisfaction based on their perceptions. The research followed a survey-based exploratory design, focusing on the impact of various physical aspects of architectural design on student learning and satisfaction through data collected via questionnaires. The study's sample size consisted of 100 high-school students, selected using purposive sampling from four specific schools in Kerala, India: Mar Baselios Public School, Pallikoodam School, The Choice School, and Marian School. Photo-realistic 3D views simulating different classroom designs were created using Google SketchUp and Lumion software. These views were projected to students using Virtual Reality glasses, and their preferences were recorded. The study found that students preferred classrooms with a combination of natural and artificial lighting, exposed masonry or bright colors, mixed seating arrangements, and additional space for activities. These findings suggested that architecture significantly impacted student satisfaction, emphasizing the need for standardized school design guidelines to enhance learning environments in India.

Gupta and Tyagi (2020) Conducted research on "Impact of Happiness Classes on the Students Studying in Schools of the Municipal Corporation, Delhi, India." The main objective of the study was to examine the impact of happiness classes on students attending Municipal Corporation of Delhi (MCD) schools, specifically by analyzing the opinions of both teachers and students regarding these classes and

their relation to students' academic achievement. The research design used was a survey method, with a sample size of 50 participants, including 25 teachers and 25 students from MCD schools. Participants were selected randomly, utilizing a simple random sampling method. The tools for data collection consisted of two inventories designed by the researchers: one measuring the opinions of teachers and the other measuring the opinions of students about happiness classes. The findings revealed no significant difference in the opinions of male and female teachers and students regarding happiness classes. The study concluded that happiness classes were somewhat related to the academic achievements of students, suggesting a positive impact on overall well-being and academic performance.

Panchal (2020) Conducted a study on "Redesigning of Interiors of Selected Café in Vadodara City". The main objective of this study was to assess the existing interior design of a selected café in Vadodara and redesign it based on the client's needs and preferences. The research employed a descriptive design technique, utilizing an observation sheet and an interview schedule to gather data. The study focused on various interior aspects, including flooring, walls, ceiling, lighting, doors, furniture, and accessories. The findings revealed that the café had a mix of hard and soft flooring, wood-paneled walls, and dark grey ceilings, with filament bulbs for lighting. Detailed design proposals, including drawings and 3D views, were provided to the client to create a more pleasant and functional café environment.

Shah (2020) Conducted a study on "Designing the interiors of selected Anganwadi under the CSR project of Sun Pharmaceutical Industries Limited". The main objective of this study was to assess the existing status of interior components and design appropriate interiors for Anganwadis in two villages, Ujeti and Kashipura, in the Panchmahal District of Gujarat under the CSR initiative of Sun Pharmaceutical Industries Ltd. The research employed a design project method carried out in four phases: assessment of existing spaces, gathering client requirements, design development, and cost estimation and implementation of the selected design. The sample consisted of two Anganwadis. The tools used for data

collection included an observation sheet and an interview schedule. The study concluded by implementing the selected designs a Forest theme for 'Nandghar Ujeti' and a Cartoon theme for 'Nandghar Kashipura' which served as models for the ICDS scheme. The learning environment and setting a model for future public-private partnerships in early childhood education spaces.

Mondal and Anubrata (2020) Carried out a study on "An approach for good lighting solutions in historical buildings in and around Kolkata". The main objective of this study is to explore and implement effective interior lighting design strategies that enhance the perception and heritage value of historical buildings in Kolkata, West Bengal, while ensuring the preservation of antique materials from the harmful effects of artificial light, particularly UV rays. The research employs a comprehensive analysis of existing literature, codes, guidelines, case studies, and experimentation. The study focuses on historical buildings like Jorasanko Thakur Bari, Chandan Nagar Museum, and Bawali Rajbari. The sampling technique involves evaluating the UV content in various light sources and applying a non-destructive methodology to protect archival materials. The research also utilizes "DIALux evo" software for designing illumination plans, considering both energy efficiency and preservation needs. The findings suggest that proper lighting solutions, when applied with a focus on non-destructive methods, can significantly enhance the preservation of historical artefacts while maintaining energy efficiency.

Jadhav and Ashok (2023) Conducted a study on "Impact of sustainable Interior Designing on occupants of high-end residential spaces in Pune city". The main objective of this study is to explore and promote sustainable interior design practices that are environmentally friendly, socially responsible, and aesthetically pleasing. The research adopts a qualitative design technique, focusing on an in-depth analysis of sustainable strategies, materials, and techniques within interior design. A purposive sampling technique is employed, with a sample size comprising selected designers, architects, and homeowners who have implemented or are interested in sustainable interior design. The tools used for research include interviews, case studies, and literature reviews to gather comprehensive insights.

The study concludes that adopting sustainable interior design practices can significantly reduce the ecological footprint of living and working spaces, contribute to healthier indoor environments, and foster a collective responsibility toward environmental preservation, ultimately leading to a greener and more sustainable future.

2.2.2 Research Studies Conducted Outside India

Hellmann (2007) Carried out a study on "Interior Design for the Classroom". The main objective of the study was to investigate best practices associated with classroom design, focusing on layout and seating arrangements, color schemes, visual displays, and accommodations for students with special needs, in order to create a successful learning environment. It primarily involved gathering and reviewing a substantial amount of literature and existing research on classroom design elements. The sampling technique used was purposive sampling, which focused on selecting research articles, text passages, and pertinent sources of data related to classroom design. The primary tool used for research was the creation of a portfolio, which included summaries of research articles and a detailed classroom floor plan. This portfolio served both as a research documentation tool and a practical guide for other educators. The study highlighted several key findings. A thoughtful classroom layout and mixed seating arrangements were found to be crucial for effective learning. Color schemes that avoided bright, bold, and busy decorations were deemed essential as they could have been distracting and negatively impactful on student performance. Visual displays needed a balance between student work and commercially prepared products to create an engaging environment. Specific design accommodations were found necessary to support students with special needs effectively. Organizing the portfolio by design elements and utilizing a floor plan helped synthesize research into practical applications for setting up an effective classroom.

Ralabate (2011) Conducted a study on "Universal Design for Learning: Meeting the Needs of All Students." The main objective was to explore how Universal Design for Learning (UDL) could have addressed diverse student needs and

enhanced educational outcomes by making curricula more flexible and inclusive. The research design included a review of existing literature and case studies of two students, Adam and Bridget, to illustrate how UDL principles could have been applied in classroom settings. The study did not specify a sample size or sampling technique as it focused on practical examples rather than quantitative analysis. Tools used included a detailed examination of UDL principles and the application of various instructional strategies and technologies. The findings indicated that UDL could have effectively reduced barriers to learning by offering multiple means of representation, action, expression, and engagement, thereby improving student engagement, motivation, and achievement. The study concluded that UDL provided a responsive and inclusive framework that supported educators in meeting the diverse needs of all students more effectively.

Frith (2015) Carried out a study on "Inside School Design: The Role of Interior Design in Cultural Change." The main objective of this study was to understand how interior design influenced learning experiences and cultural change in purposefully designed learning environments, specifically within learning neighborhoods. The research employed a case study approach, examining four learning neighborhoods using photographic observation, semi-structured interviews, and visual analysis to assess patterns of activity and behavior. The study did not specify a numerical sample size, focusing instead on the selected case studies. A purposive sampling technique was used to select the learning neighborhoods, ensuring relevance to the study's objectives. The key finding was that while purposefully designed learning neighborhoods could shape learning experiences, the lack of understanding of interior design among school communities limited teachers' ability to fully leverage these environments for cultural change. The study concluded with the development of a pattern language that served as a communication tool for school communities and design professionals, facilitating more effective design briefs and better-functioning schools.

Wall (2016) Carried out a study on "The Impact of Physical Design on Student Outcomes." The main objective of this study was to explore the design features of learning spaces and their impact on student learning and achievement, with an emphasis on creating inclusive environments that accommodated diverse learning needs. The research employed a combination of secondary data collection, including a literature review, and primary data collection through qualitative methods like semi-structured interviews and focus groups with subject matter experts, selected using purposive sampling. While the study did not specify a numerical sample size, it utilized constant comparative analysis to identify themes from qualitative data. The findings highlighted that flexible learning spaces could enhance teaching and learning if teachers were supported in adapting their pedagogical approaches and considered the physical environment in their planning. The study also underscored the role of innovative learning environments in promoting inclusivity, though it acknowledged that many studies failed to account for other influencing factors like teacher effectiveness or student self-belief.

Rands and Gansemer-Topf (2017) Conducted a study on "The Room Itself Is Active: How Classroom Design Impacts Student Engagement." The study aimed to investigate how the redesigned active learning classroom (ALC) influenced student engagement by examining the relationship between classroom design and environmental and behavioral factors. The study employed a qualitative case study assessment with a cross-sectional design, allowing for an in-depth exploration of the impact of classroom redesign on student engagement and perceptions, focusing on a single case (the redesigned classroom). The study included a small sample with four instructors and nine students, resulting in a total of 13 participants. The sampling was purposive, focusing on participants who had direct experience with the redesigned classroom. The aim was to include individuals who had taught or taken courses in the redesigned Active Learning Classroom (ALC) during specific semesters to capture a range of perspectives. Data collection involved focus groups and semi-structured interviews to capture a range of perspectives on the redesigned classroom. Recordings and transcriptions of these sessions facilitated detailed analysis of participant feedback. The study revealed that the redesigned classroom

enhanced student engagement by fostering collaboration and flexible learning environments. The analysis of participant feedback highlighted the benefits of the design in creating a dynamic and interactive learning space.

Taheri (2019) Carried out a study on "Studying the Effect of Classroom Interior Design on the Happiness and Mental Health of the Female Adolescent Students" at Shiraz, Iran. The main objective of this study was to investigate the effect of classroom interior design on the happiness and mental health of ninth-grade girl students in Shiraz during the academic year 2015-16. The research employed a randomized cluster sampling method to select 60 students, who were then divided into experimental and control groups. The study utilized a research design involving three stages: pre-test, post-test, and follow-up, with the Oxford Happiness and Mental Health Questionnaire as the primary tool. The results of the variance analysis with repeated measurements initially showed no significant relationship between classroom interior design and the measured variables. However, upon re-analyzing the data without the follow-up stage, a significant increase in happiness was observed, and the interior design was found to significantly affect the mental health subscales, particularly anxiety and physical symptoms. The study concluded that classroom interior design does impact students' well-being, emphasizing the importance of designing environments that consider the influence of environmental characteristics on student happiness and mental health.

Morgham and Ibrahim (2022) Carried out a study on "The Role of Classrooms Interior Design in Creating a Creativity Supportive Environment in the Shade of the New Education Philosophy" at Egypt. The primary objective of this study is to assess the role of classroom interior design in fostering a creativity-supportive environment within the framework of Egypt's new educational philosophy. The research adopts a qualitative design technique, evaluating the current state of classroom interiors and identifying weaknesses that hinder student motivation during the educational process. The study utilizes a purposive sampling technique, focusing on a specific sample size of primary school classrooms within the

Egyptian educational system. Research tools include observations, interviews with educators, and analysis of interior design elements in relation to student learning styles and the new educational philosophy. The study concludes that the current classroom designs in Egypt lack key environmental, emotional, social, physical, and psychological considerations, which are critical for achieving the goals of the reformed educational system. It recommends the integration of nontraditional design solutions, supported by applied research and collaboration with interior designers, to enhance creativity and effectively implement the new educational philosophy in Egyptian primary schools.

Oruikor et al. (2023) Conducted a study on "The Impact of Classroom Design on Student Learning: A Case Study of Cameron Schools." The main objective of the study was to discover how to enhance the learning environment for students in Cameroon by reviewing related work on how classroom design affected the learning outcomes of students. The research design technique used in this study was a narrative review, which involved reviewing and analyzing peer-reviewed published research articles. The initial sample size included 40 citations. After screening titles and abstracts, 25 articles were retrieved for full-text reading, and ultimately, 12 articles were found relevant for the critical review process. The sampling technique involved screening articles based on their titles, abstracts, and full-text content to identify those relevant to the study's objectives. The tool used for research was the narrative review of peer-reviewed published articles. The study concluded that classroom design significantly impacted students' academic performance, health, and well-being. Critical environmental variables identified included temperature, acoustics, and lighting. Incorporating these factors into classroom design in Cameroon could have greatly enhanced student learning outcomes.

Sloboda (2023) Conducted a study on "The Role of the Interior Designer in the Autistic Classroom: Location and Material Selection are Essential for Success." The main objective of this study was to explore how multi-sensory room attributes could be integrated into general classroom design to create inclusive learning

environments that catered to the sensory needs of students with autism spectrum disorder (ASD) and sensory processing disorder (SPD). The study used a mixed-methods design, combining both qualitative and quantitative approaches. The qualitative descriptive design was employed to achieve the study's aim, while questionnaires and semi-structured interviews were used to gather data. The sample size included all special education teachers in a medium-sized public school district in Western Pennsylvania. The sampling technique was purposive sampling, focusing on special education teachers who had experience and knowledge relevant to the study's objectives. The research utilized questionnaires for the quantitative portion to gather general usage information and semi-structured interviews for the qualitative portion to explore detailed experiences and insights regarding the MSR usage and classroom design elements. The study found that the most beneficial design elements for autistic classrooms included optimal location, appropriate lighting, and careful material selection. Classrooms should have been placed away from noisy and odorous areas, utilized natural lighting with adjustable options, and incorporated materials that aided in sensory regulation and minimized distractions. These design considerations ensured a more inclusive and supportive environment for special education students.

Yangambi (2023) Conducted a study on "Impact of School Infrastructures on Students Learning and Performance: Case of Three Public Schools in a Developing Country" in Ngaliema, Kinshasa. The main objective of this study was to examine the impact of school infrastructure on students' academic performance in three secondary schools in the Kinshasa-Ngaliema education division. Employing a quantitative research design, the study used a directly administered questionnaire, which was validated and consisted of items measuring the effects of school infrastructure on teaching, learning, and student achievement. The sample size included 108 teachers selected through convenience sampling. The findings revealed a strong correlation between the condition of school facilities and student achievement, indicating that well-maintained and modern infrastructure significantly enhanced learning outcomes. The study concluded that continuous improvements in school infrastructure.

Zoubi et al. (2023) Conducted a study on "The Influence of Light Colour Temperatures on Interior Design Student Performance in Classroom Studios" in Irbid, Jordan. The main objective of this study was to examine how lighting conditions impacted perceived spatial quality, comfort, collaboration, motivation, distraction, and fatigue in a classroom studio. The research used a survey method to collect data from 124 students, analyzing their responses based on factors like spaciousness, natural light, and brightness levels. The study employed purposive sampling to target students in a classroom studio setting. The findings indicated that high color temperature lighting conditions made the studio feel more spacious, comfortable, and conducive to collaboration, with fewer distractions and lower fatigue levels. Conversely, low color temperature lighting made the space feel cramped and less motivating. The study concluded that lighting conditions significantly affected various aspects of the learning environment, emphasizing the importance for educators and designers to consider these factors in creating effective classroom settings.

Kolosova and Nikoliuk (2024) Conducted a study on "Interior Design in A Pre-School Educational Institution". The main objective of this study is to investigate the influence of interior design on the personality development of preschool children, emphasizing the importance of creating a safe, comfortable, and nurturing environment in kindergartens. The research design technique is a qualitative analysis based on literature review and observational studies of existing preschool environments. Although the study does not specify a sample size or sampling technique, it focuses on assessing the use of high-quality, ecological materials in preschool interiors to prevent diseases and allergies, thereby ensuring a healthy and pleasant environment for children. The findings conclude that well-designed preschool interiors, considering factors such as lighting, color, furniture, and layout, are crucial for fostering a positive, engaging, and supportive atmosphere that significantly impacts a child's development and well-being.

Loredan et al. (2024) Conducted a study on "Classroom Interior Design: Wooden Furniture Prototype with Feedback from Students and Teachers". The main

objective of this study was to design and evaluate a prototype wooden standing desk for classrooms, aiming to enhance students' well-being and reduce sedentary behavior. The research employed a qualitative research design, using focus groups to gather feedback from primary school students and teachers. The study involved a mixed team of experts in human factors, architecture, design, and engineering. The exact sample size and sampling technique are not specified, but feedback was collected from both students and teachers. The findings revealed that the wooden standing desk prototype was well-received, with particular praise for the height adjustability and tiltable tabletop. However, students noted the need for a more resistant wooden tabletop. The study concluded that further research is necessary to optimize the material, shape, and color of school desks to promote a less sedentary classroom environment and improve students' well-being.

2.3 Conclusion

The studies conducted in India focused on enhancing student satisfaction in classrooms, Impact of happiness classes on student well-being, assessing and improving Anganwadi interiors, redesigning spaces and developing autism-friendly classrooms, Redesigning café interiors and assessing classroom interior standards, Improvements in classroom interior design, thematic elements in Anganwadis, and sensitivity to special needs are crucial for enhancing the overall experience in various settings.

The studies conducted outside India emphasized various critical aspects of classroom and educational design, focusing on best practices, student engagement, and the unique needs of students, including those with autism. They highlighted the significance of elements such as lighting, physical design, and Universal Design for Learning (UDL) in fostering inclusive, supportive, and effective learning environments. The research collectively underscores the importance of well-designed educational spaces in enhancing student performance, well-being, and overall satisfaction across diverse settings, from specialized classrooms to broader infrastructural improvements.

There was a dearth of research identified in Assessing Interior Design Aspects of a Classroom and Proposing Suitable Design for Selected Municipal School of Vadodara City. Hence the present investigation was carried out.

METHODOLOGY

CHAPTER III

METHODOLOGY

Research methodology is a science to study how research is done systematically and scientifically (Kothari, 2014). The present study aims to assess interior design aspects of a classroom and proposing suitable design for selected municipal schools of Vadodara city. To gather detailed information on various interior design aspects within the classroom, observation sheet was employed as the data collection tool. Additionally, the study aimed to identify the extent of problems experienced by teachers and assess their opinions regarding the existing classroom design in selected municipal schools in Vadodara city. For systematic presentation, this chapter is divided into the following sections:

3.1 Research Design

3.2 Operational Definitions

3.3 Locale of the Study

3.4 Unit of Inquiry

3.5 Sample size and Sampling Technique

3.6 Selection, Description and Development of the Tool

3.7 Data Collection

3.8 Data Analysis

3.9 Design Development

3.10 Cost Estimation

3.1 Research Design

The research design for the present study was descriptive in nature. Descriptive research design focuses on identifying and analyzing existing conditions, relationships, opinions, and trends. In this study, the aim was to systematically collect and analyze data regarding the interior design aspects of classrooms of selected municipal schools of Vadodara city. The research involved documenting existing design of classroom, identifying extent of problem faced by school teachers, assessing opinion related to existing design of a classroom, and proposing suitable design improvements based on the gathered information. The descriptive approach enabled a comprehensive understanding of the current interior design conditions and provided insights for developing appropriate solutions.

3.2 Operational Definitions

To ensure the development of an appropriate tool for the present investigation certain terms were operationally defined.

3.2.1 Interior Design: It is operationally defined as the comprehensive assessment and planning of the physical aspects in interior within a classroom environment, including classroom details, surface treatment of walls, floors, and ceilings, furniture and furnishings, interior accessories, color, lighting, ventilation, electrical and telecommunication services, as well as features like accessibility and occupancy.

3.2.2 Interior Design Aspects: It is operationally defined as the selected factors in an interior of a classroom like surface treatment of walls, floors, and ceilings, furniture and furnishings, interior accessories, color, lighting, ventilation, electrical and telecommunication services, as well as features like accessibility and occupancy.

3.2.3 Classroom: It is operationally defined as physical space within a school where educational activities take place. It is equipped with furniture such as desks and chairs, and teaching tools like a blackboard or whiteboard, projector, television which facilitate learning and interaction between students and teachers.

3.2.3 Extent of Problems: It is operationally defined as the difficulties and challenges faced by teachers and students related to interior design aspects in the classrooms of selected municipal schools in Vadodara city. These aspects include placement, size, material, ease of use, accessibility, safety, maintenance, aesthetics, and overall comfort level.

3.2.4 Opinion: It is operationally defined as the perception and judgment of teachers regarding the classroom design in selected municipal schools of Vadodara city.

3.3 Locale of the Study

The present study was conducted in Vadodara city, Gujarat, India. Vadodara is strategically located with great accessibility to Mumbai and Delhi via both the railway line and national highway and hence has been known as the Gateway to the Golden Quadrilateral. It is the cultural capital of Gujarat, which is the third-largest city in the Western Indian state of Gujarat, after Ahmedabad and Surat. The city is renowned for its rich heritage, educational institutions, and vibrant art scene. It is home to prestigious institutions like Maharaja Sayajirao University, which attracts students from across the country. Additionally, Vadodara is known for its industrial development and growing infrastructure, making it an emerging hub for business and innovation.

3.4 Unit of Inquiry

The unit of inquiry consisted of teachers who have been working for more than 5 years in the selected municipal schools of Vadodara city from the time of data collection.

3.5 Sample size and Sampling Technique

3.5.1 Purposive Sampling Technique: According to Kothari and Garg (2014), Purposive sampling technique is a method of collecting samples involves selection of particular units of the universe for constituting a sample which represents the whole universe.

The sample size for the study was 80 teachers who had been working for more than five years in selected municipal schools of Vadodara city.

3.5.2 Sample Selection

Inclusion Criteria:

1. The study included five selected municipal schools located within Vadodara city.
2. The study include teachers who have been working at the school for more than 5 years from the time of data collection.
3. The study included teachers who are willing to participate in the survey.

Exclusion Criteria:

1. The study excluded those schools which were private and those which were located outside Vadodara city.
2. The study excluded those teachers who had been employed for less than 5 years.
3. Teachers who were not willing to participate in the study were excluded.

5.3.3 Sampling procedure
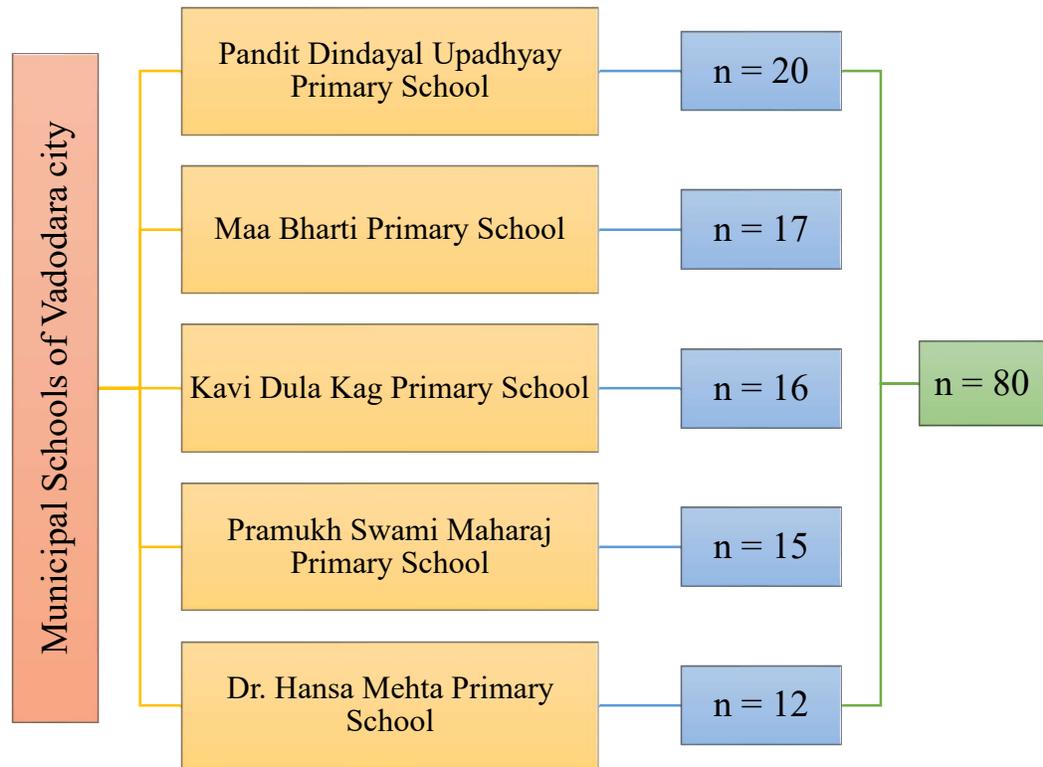
Figure 1: Sample size and Sampling procedure

3.6 Selection, Description and Development of the Tool

3.6.1 Selection of the tool

Based on the information collected through a review of related literature, interactions and guidance from experts, and personal observation, an interview schedule was prepared to identify the extent of problems experienced by teachers and questionnaire was prepared to assess opinion of teachers regarding existing design of classroom in selected municipal schools of Vadodara city. Care was taken to include all questions necessary to obtain the information needed to achieve the objectives of the study. An observation sheet was also prepared to assess various interior design aspects of the classroom in selected municipal schools of Vadodara city.

Section I: Observation Sheet

Observation schedule is the most commonly used method, in studies relating to behavioral sciences. It is a scientific tool and the method of data collection for the researcher which was used for observing the interior spaces of a room of selected schools. (Kothari, 2014). The observation schedule has following advantages:

1. The subjective bias is eliminated, if observation is done accurately.

2. The information obtained under this method relates to currently situations.

3. This method is independent of respondents' willingness to respond and as such is relatively less demanding of active cooperation on the parts of respondents.

The observation schedule was selected as tool because it constitutes a careful, systematic watching of facts as they occur in course of nature. The investigator observed and recorded the information in the data sheets. The observation schedule was used as a tool for assess existing design of classroom in selected municipal schools of Vadodara city, where the various aspects with regard to classroom details, namely surface treatment of walls, floors, and ceilings, furniture and

furnishings, interior accessories, colour, lighting, ventilation, electrical and telecommunication services, as well as features like accessibility and occupancy was collected.

Section II: Interview Schedule

Interview schedule had been thought to be the best suited tool for collection of data since it involves presentation of oral-verbal stimuli and reply in terms of over-verbal responses (Kothari, 2014). The interview schedule has following advantages:

1. More information in greater depth can be obtained.

2. Samples can be controlled more effectively as there arises no difficulty of the missing returns; non-response generally remains very low.

3. The interviewer can collect supplementary information about the respondent's personal characteristics and environment which is often of great value in interpreting results.

For the present study, the interview schedule included problems experienced by the respondents related to placement and arrangement, quantity, size, material and finishes, ease of use, accessibility, safety and security, maintenance, aesthetics and overall comfort level with regards to various interior design aspects in a classroom of selected municipal schools of Vadodara city.

Section – III Questionnaire

A questionnaire is a research instrument that consists of a set of questions or other types of prompts that aims to collect information from a respondent. A research questionnaire is typically a mix of close-ended questions and open-ended questions. The Questionnaire has following advantages:

1. It was cost effective.
2. It enabled sufficient time to the respondents to give well thought out answers.

3. The results via questionnaire were more dependable and reliable.

The questionnaire included statements to assess the opinion of school teachers regarding the existing design of classroom in selected municipal schools in Vadodara city.

3.6.2 Description of Tool

The extensive literature survey helped the investigator to prepare the required tool to assist data collection for the present study.

3.6.2.1 Description of Observation Sheet

To assess the existing conditions and various aspects of the classroom interiors in the selected municipal schools, a detailed observation sheet was developed. The observation sheet was divided into five parts to ensure comprehensive data collection and analysis. The description of each part is as follows:

A: Background Information

This section gathers essential background data about the school, such as school name, address, contact details of the principal and year of establishment. Information regarding the school's working hours was also collected to provide contextual information for the study.

B: General Information of the Classroom

In this section, data on the physical characteristics of the classroom was collected. This included details such as the class name or number, direction of the classroom, and the classroom's location within the school. Additionally, information regarding the classroom's shape and dimensions was documented to help assess the space available in relation to its usage.

C: Interior Design Aspects of the Classroom

This section addressed the interior design aspects of the classroom, detailing the materials used for ceilings, walls, and floors, along with their condition,

finish, and color intensity. It also included information on classroom furniture and furnishings, their arrangement, and interior decorative elements. Additionally, it covers information about doors and windows, including their size and material. The assessment further extends to lighting and ventilation sources, as well as the number and placement of fans.

D: Electrical and Telecommunication Services in the Classroom

This section reviewed the availability and functionality of electrical and telecommunication services in the classroom, covering digital devices, essential electrical fixtures, and internet services like Wi-Fi and LAN. It also considers telecommunication tools, such as video conferencing equipment. This evaluation is key to understanding the classroom's digital infrastructure and its suitability for technology integration.

E: Additional Interior Design Features for the Classroom

The final section focuses on the additional interior design features necessary for creating an inclusive and functional classroom environment. This includes the availability of accessibility features like wheelchair access and adjustable furniture. Additionally, data on occupancy, such as the maximum seating capacity and current number of students, was collected to assess comfort and flexibility in movement within the classroom. Aspects like adequate ventilation, lighting, and freedom from distracting noise are also evaluated to understand the overall comfort and suitability of the classroom.

3.6.2.2 Description of Interview Schedule

To identify extent of problem experienced by the teachers regarding the existing design of the classroom in selected municipal schools of Vadodara city, the interview schedule was divided into two sections which are described as follows:

A: Background Information of the Respondents

This section gathered background information about the respondents, including their name, contact details, age, gender, educational qualifications, working hours, and years of experience. This information helped contextualize the responses based on the teachers' professional background.

B: Extent of Problems experienced by the school teachers regarding the Existing Design of Classroom in selected Municipal Schools of Vadodara City.

This section focused on identifying the extent of problems experienced by teachers related to existing design of classroom. Teachers were asked to identify problems related to placement, quantity, size, material, ease of use, accessibility, safety, maintenance, aesthetics, and overall comfort level in classroom of selected municipal schools of Vadodara city.

The responds structure for the scale was on a 3-point scale: 1 – No problem, 2 – Minor problem, and 3 – Major problem. This scale helped quantify the extent of the problems faced by the teachers. Higher scores indicated To a High Extent of Problem and lover score indicate To a Low Extent of Problem with regards to selected interior design aspects.

3.6.2.3 Description of Opinion Scale

This section included statements to assess the opinion of school teachers regarding the existing design of classroom in selected municipal schools in Vadodara city. It comprised a Likert-type summated rating scale with a 3-point continuum for responses: "Agree," "Neutral," and "Disagree," which were scored 3 through 1, respectively. A higher score indicated favorable opinion of the respondents on the scale and vice-versa.

3.6.3 Establishment of Content Validity

Validity indicated the degree to which a tool measures what it is supposed to measure (Kothari, 2012). The tool prepared by the researcher for the present study was given to the panel of eleven judges from Department of Family and Community Resource Management, Faculty of Family and Community Science, The Maharaja Sayajirao University of Baroda, Vadodara. It was also given to Practicing Interior Designers and Architects. The judges were requested to judge whether the listed items under each aspect were clear or ambiguous or relevant or irrelevant. The valuable suggestions given by the experts was adopted and the tools were modified and finalized for the data collection.

3.6.4 Establishment of Reliability

The reliability was established for selected scales prepared by the researcher.

Reliability of the scales: The reliability of the scale was established through internal consistency, based on the average inter-item correlation to establishing reliability. The Cronbach's alpha test has been applied on 30 samples. The formula of Cronbach's alpha is as below:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

Where, N is the number of items, $\bar{c}$ = average covariance between item-pairs, $\bar{v}$ = average variance. In order to get overview of each of the scale used in present study, the reliability coefficient was as given below (Table 1). The reliability values were found to be high for all the scales as reported below.

Table 1: Overview of the scale with reliability value

Sr. No.	Scale	Reliability values
1.	Opinion of school teachers regarding the Existing Interior Design of Classroom in selected Municipal Schools of Vadodara City.	0.89

3.7 Data Collection

The data were gathered by the researcher between October 2024 to December 2024. The interview Schedule and observation sheet were used for data collection. The purpose of the research was explained and rapport was built so as to get the true responses. The investigator personally interviewed the teachers of the municipal schools of Vadodara.

3.8 Data Analysis

The procedure of analyzing the data will comprise of categorizations, coding and tabulation.

3.8.1 Categorization

The following categories were made to enable research to analyse the data for school teachers.

A: Demographic profile of the respondents

1. Age of the respondents (in years): The obtained range of the respondents on the basis of equal intervals are as follow:
   - 26-35 years
   - 36-45 years
   - 46-55 years

2. Gender of the respondents:
   - Male
   - Female

3. Educational qualification of the respondents:
   - Graduate
   - Post-Graduate
   - Ph.D.
   - PTC

4. Number of working hours at the school of the respondents:
   - 5-6 hours
   - 7-8 hours

5. Years of work experience in the school of the respondents:

- 2-12 years
- 13-22 years
- 23-33 years

B. Extent of Problems experienced by the school teachers regarding the Existing Design of Classroom in selected Municipal Schools of Vadodara City.

- 1 – To a Low Extent of Problem
- 2 – To a Moderate Extent of Problem
- 3 – To a High Extent of Problem

Table 2: Categorization and range of scores for Opinion of school teachers regarding the Existing Interior Design of Classroom in selected Municipal Schools of Vadodara City

Sr. No.	Opinion of teachers regarding existing design of classroom	Range of score
1.	Highly favorable	35 - 45
2.	Moderately favorable	25 - 34
3.	Unfavorable	15 - 24

This section included statements to assess the opinion of school teachers regarding the existing design of classrooms in selected municipal schools in Vadodara city. A set of 15 statements was developed and responses were recorded using a 3-point Likert-type summated rating scale: "Agree," "Neutral," and "Disagree," which were assigned scores of 3, 2, and 1, respectively. A higher score indicated a highly favorable opinion among respondents, while a lower score reflected Unfavorable opinion. The minimum possible score for the opinion scale was 15, and the maximum score was 45. The possible range of scores was divided into three equal intervals representing categories of "Highly favorable", "Moderately favorable," and " Unfavorable".

3.9 Design Development

Redesigning classroom space for municipal schools is a very crucial task. For the present research, the data were gathered through the observation schedule reflecting the existing interior status of the classroom of selected municipal schools of Vadodara city. Special considerations as given by various interior designer and Architects were used for redesigning. Out of five municipal schools assessed, one classroom of selected school was selected for redesigning as per the agreement from the authorities. Three design options were proposed for the classroom. For creating visual projections AutoCAD 2024, Sketchup 2023 and Lumion 8.5 software were utilized for drawing Floor plan, Four wall elevation, Electric layout, False ceiling and 3D views.

Table 3: Schedule of Existing Drawings of classroom of Municipal Schools of Vadodara city

Sr. No.	Drawing Title	No. of Drawings
1.	Existing Layout Plan of selected classroom	01
2.	Existing Floor Plan of selected classroom	01
3.	Existing Electrical Layout of selected classroom	01
4.	Existing Furniture Layout of selected classroom	01

Table 4: Schedule of Proposed Drawings of classroom of Municipal Schools of Vadodara city

Sr. No.	Drawing Title	No. of Drawings
1.	Proposed Floor Plan	01
3.	Proposed Electrical Layout	01
4.	Proposed False Ceiling Layout	01
5.	Propose Four Wall AB Elevation	01
6.	Propose Four Wall BC Elevation	01
7.	Propose Four Wall CD Elevations	01
8.	Propose Four Wall DA Elevations	01
9.	Propose Furniture Layout	01

3.10 Cost Estimation

In the successful planning and execution of any interior design research, accurate cost estimation is a critical component. It ensures that the financial aspects align with the proposed design outcomes. For this study, cost estimates were developed based on the actual prices of materials required for the proposed redesign of selected municipal school classrooms. The estimates considered various design components such as surface treatments, furniture, lighting, and digital infrastructure.

A medium-budget solution was proposed, ensuring a balance between quality, durability, and cost-effectiveness. This budget framework aligns with government tender approvals, making the project feasible for implementation within municipal schools. By focusing on a single cost option, the design maintains both practicality and sustainability while meeting financial and regulatory requirements.

FINDINGS & DISCUSSIONS

CHAPTER IV

FINDINGS AND DISCUSSION

An attempt was made to assess interior design aspects of a classroom and proposing suitable design for selected municipal schools of Vadodara city. Classroom data was collected using an observation sheet, interview schedule, and a questionnaire. In order to report the findings in a more systematic and presentable manner, the chapter has been divided into the following sections:

Section I: Demographic profile of the respondents

Section II: The extent of problems experienced by teachers regarding existing design of classroom in selected municipal schools in Vadodara city.

Section III: Opinion of teachers regarding existing design of classroom in selected municipal schools in Vadodara city.

Section IV: Design Development of the selected municipal school in Vadodara city.

> Phase I: Details of interior design aspects of a classroom in selected municipal schools of Vadodara city as recorded in observation sheet.
>
> Phase II: Design Development of the selected municipal school in Vadodara city.
>
> Phase III: Cost Estimation of the proposed Design Project.

Section I: Demographic profile of the respondents

This section deals with demographic information of the respondents considered for the present study, which included parameters like; age, gender, educational qualification, number of working hours at the school and years of work experience in the school.

Table 5: Distribution of the respondents according to their Personal Information

Sr. No.	Personal Information of the Respondents	Respondents (n = 80)	
		f	%
1.	**Age (in years)**		
	26-35 years	08	10.00
	36-45 years	45	56.25
	46-55 years	27	33.75
	Mean	43.36	
	S.D	06.70	
2.	**Gender**		
	Male	25	31.25
	Female	55	68.75
3.	**Educational qualification**		
	Graduate	32	40
	Post-Graduate	25	31.25
	Ph.D.	8	10
	PTC (Parent Teacher Council)	15	18.75
4.	**Number of working hours at the school**		
	5-6 hours	55	68.75
	7-8 hours	25	31.45
	Mean	06.40	
	S.D	00.87	
5.	**Years of work experience**		
	2-12 years	33	41.25
	13-22 years	22	27.5
	23-33 years	25	31.25
	Mean	17.63	
	S.D	7.76	

Age: The respondents' age ranged from 26 to 55 years at the time of data collection. Majority of the respondent, 56.25 percent belonged to the age group of 36 to 45 years, indicating that a significant portion of the participants were in their mid-career stage. Additionally, 33.75 percent of the respondents fell within the age group of 46 to 55 years, while 10 percent belonged to the younger age group of 26 to 35 years. This distribution highlights that the respondents were predominantly experienced professionals, with only a few fallings into the early career category.

Gender: The gender distribution of the respondents revealed that the majority, 68.75 percent were females, while 31.25 percent were males. This indicates that male respondents formed a significant portion of the sample, whereas male participation was comparatively lower.

Educational qualification: The educational qualification of the respondents showed that graduates formed the largest group, accounting for 40 percent of the total population. Post-graduates constituted 31.25 percent of the respondents, while those holding a PTC (Parent Teacher Council) qualification made up 18.75 percent. The respondents with a Ph.D. qualification represented the smallest group, comprising 10 percent of the total sample.

Number of working hours at the school: The data on the number of working hours revealed that the majority of respondents 68.75 percent worked between 5 to 6 hours daily, while 31.25 percent reported working for 7 to 8 hours. This indicates that most respondents had relatively moderate working hours, with a smaller proportion having longer work durations.

Years of work experience: The data on years of work experience showed that a significant portion of the 41.25 percent respondents had experience of 2 to 12 years in working with the school. About 27.5 percent of the respondents had work experience ranging from 13 to 22 years, while 31.25 percent had been working for 23 to 33 years.
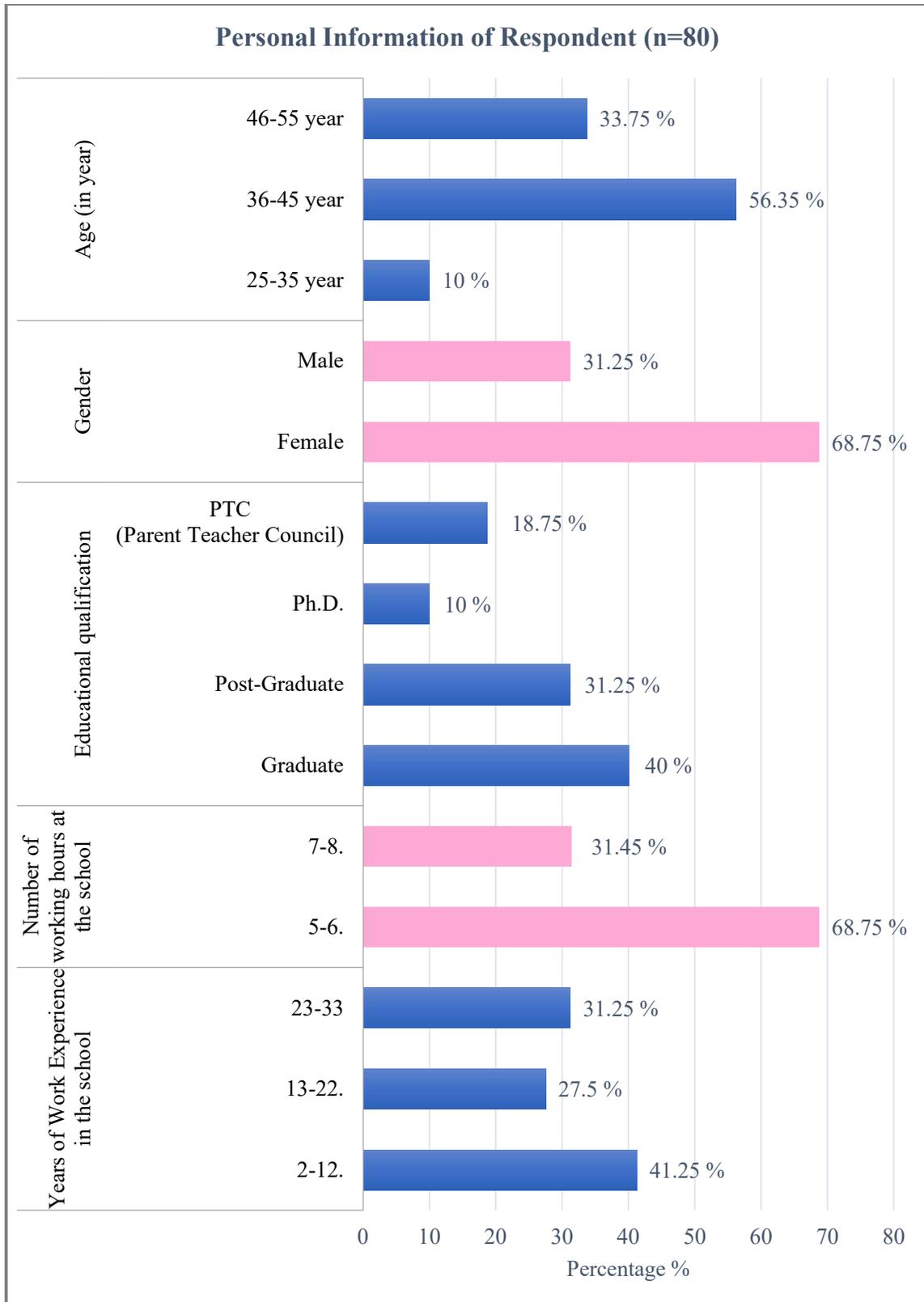
Figure 2: Percentage distribution of the respondents according to their personal information

Section II: The extent of problems experienced by teachers regarding existing design of classroom in selected Municipal Schools of Vadodara city.

This section aimed to assess the extent of problems faced by teachers concerning the current design of classrooms in selected municipal schools of Vadodara city. Teachers were asked to identify problems related to various interior aspects of the classroom design namely wall, ceiling, floor, furniture and furnishings, interior accessories, color, lighting, ventilation, electrical and telecommunication services, as well as features like accessibility and occupancy with their placement, quantity, size, material, ease of use, accessibility, safety, maintenance, aesthetics, and overall comfort extent.

A 3-point continuum scale was used for the responses, with problems experienced To a High Extent of Problem (3), To a Moderate Extent of Problem (2), and To a Low Extent of Problem (1). This scale allowed for quantifying the severity of the problems experienced by the teachers. Higher scores corresponded to problems experienced to a high extent and vice-versa.

1. **Interior design aspects**
   A. **Surface treatment:** The data reflected the extent of problems experienced by teachers regarding surface treatment applied for ceiling, walls and floors of all 5 municipal schools.

Table 6: Distribution of the respondents according to their extent of problems experienced regarding surface treatment applied for ceiling, walls and floors

	Respondents (n=80)					
	To High Extent		To Moderate Extent		To Low Extent	
	f	%	*f*	%	*f*	%
Design Consideration for Wall						
Size/ Dimensions	18	22.5	12	15	50	62.5
Material/ Finish	38	47.5	21	26.25	21	26.25
Ease of Use/ operability	27	33.75	16	20	37	46.25
Safety/ security	23	28.75	20	25	37	46.25
Maintenance/ Present condition	42	52.5	21	26.25	17	21.25
Aesthetics	38	47.5	30	37.5	12	15
Overall Comfort Level	38	47.5	29	36.25	13	16.25
Design Consideration for Floor						
Size/ Dimensions	15	18.75	7	8.75	58	72.5
Material/ Finish	32	40	30	37.5	18	22.5
Ease of Use/ operability	34	42.5	23	28.75	23	28.75
Safety/ security	21	26.25	29	36.25	30	37.5
Maintenance/ Present condition	30	37.5	41	51.25	9	11.25
Aesthetics	26	32.5	35	43.75	19	23.75
Overall Comfort Level	36	45	25	31.25	19	23.75
Design Consideration for Ceiling						
Size/ Dimensions	15	18.75	20	25	45	56.25
Material/ Finish	35	43.75	24	30	21	26.25
Ease of Use/ operability	32	40	20	25	28	35
Safety/ security	34	42.5	20	25	26	32.5
Maintenance/ Present condition	38	47.5	25	31.25	17	21.25
Aesthetics	43	53.75	23	28.75	14	17.5
Overall Comfort Level	45	56.25	25	31.25	10	12.5

Findings in relation to design considerations for wall: The findings in the above table highlighted that 52.5 percent of respondents experienced problem to a high extent with the maintenance and present condition of classroom walls, highlighting problems such as damage, cracks, and peeling paint. Additionally, 47.5 percent of respondents experienced high extent of problem about the material or finish, aesthetics, and overall comfort extent of the walls, suggesting that poor-quality surfaces and unappealing design contribute to discomfort in the learning environment. These problems underscore the need for better wall materials, regular upkeep, and improved aesthetics to create a more conducive classroom setting.

Findings in relation to design considerations for floor: The findings in the table highlighted that 42.5 percent of respondents experienced problems with the ease of use and operability of the classroom floor, indicating difficulties related to movement, walking comfort, and adaptability for various activities. Additionally, 40 percent of respondents reported concerns about the material or finish of the floor, suggesting problems such as poor-quality floor materials, slipperiness, or discomfort while walking. These findings underscore the need for durable, non-slippery, and well-maintained flooring to ensure a safer and more functional classroom environment.

Findings in relation to design considerations for ceiling: The findings in the table highlighted that the overall comfort extent of the ceiling received the highest concern, with 56.25 percent of respondents experiencing problems to a high extent. This suggests that factors such as temperature control, ventilation, and overall ceiling conditions significantly impacting the classroom interiors. Additionally, 53.75 percent of respondents experienced high extent of problem about the aesthetics of the ceiling, indicating that its visual appeal and design elements were perceived as not appealing. These results emphasize the need for improvements in ceiling design, including better materials, maintenance, and aesthetic enhancements to create a more comfortable and visually appealing classroom setting.

B. Furniture: The data reflected the extent of problems experienced by teachers regarding furniture of all 5 municipal schools.

Table 7: Distribution of the respondents according to their extent of problems experienced regarding furniture

	Respondents (n=80)					
	To High Extent		To Moderate Extent		To Low Extent	
	f	%	f	%	f	%
Design Consideration for Teacher's desk						
Placement/ arrangement	41	51.25	22	27.5	17	21.25
Quantity/ Numbers	38	47.5	22	27.5	20	25
Size/ Dimensions	40	50	29	36.25	11	13.75
Material/ Finish	38	47.5	32	40	10	12.5
Ease of Use/ operability	33	41.25	22	27.5	25	31.25
Accessibility	34	42.5	23	28.75	23	28.75
Safety/ security	32	40	21	26.25	27	33.75
Maintenance/ Present condition	37	46.25	25	31.25	18	22.5
Aesthetics	36	45	25	31.25	19	23.75
Overall Comfort Level	38	47.5	21	26.25	21	26.25
Design Consideration for Teacher's chair						
Placement/ arrangement	35	43.75	21	26.25	24	30
Quantity/ Numbers	28	35	16	20	36	45
Size/ Dimensions	33	41.25	21	26.25	26	32.5
Material/ Finish	38	47.5	19	23.75	23	28.75
Ease of Use/ operability	18	22.5	10	12.5	52	65
Accessibility	16	20	19	23.75	45	56.25
Safety/ security	28	35	25	31.25	27	33.75
Maintenance/ Present condition	16	20	12	15	52	65
Aesthetics	41	51.25	22	27.5	17	21.25
Overall Comfort Level	44	55	29	36.25	7	8.75

	Respondents (n=80)					
	To High Extent		To Moderate Extent		To Low Extent	
	f	%	*f*	%	*f*	%
Design Consideration for Student's Desk/Bench						
Placement/ arrangement	37	46.25	21	26.25	22	27.5
Quantity/ Numbers	21	26.25	23	28.75	36	45
Size/ Dimensions	39	48.75	32	40	9	11.25
Material/ Finish	31	38.75	25	31.25	24	30
Ease of Use/ operability	21	26.25	16	20	43	53.75
Accessibility	18	22.5	20	25	42	52.5
Safety/ security	23	28.75	21	26.25	36	45
Maintenance/ Present condition	34	42.5	27	33.75	19	23.75
Aesthetics	38	47.5	21	26.25	21	26.25
Overall Comfort Level	42	52.5	21	26.25	17	21.25
Design Consideration for Storage Units						
Placement/ arrangement	44	55	26	32.5	10	12.5
Quantity/ Numbers	23	28.75	21	26.25	36	45
Size/ Dimensions	38	47.5	21	26.25	21	26.25
Material/ Finish	29	36.25	29	36.25	22	27.5
Ease of Use/ operability	19	23.75	16	20	45	56.25
Accessibility	16	20	11	13.75	53	66.25
Safety/ security	21	26.25	18	22.5	41	51.25
Maintenance/ Present condition	32	40	38	47.5	10	12.5
Aesthetics	36	45	26	32.5	18	22.5
Overall Comfort Level	26	32.5	22	27.5	32	40

Findings in relation to design considerations for teacher's desk: The findings in the above table indicated that placement/arrangement of the teacher's desk was the most significant concern, with 51.25 percent of respondents reporting problems to a high extent. This suggests that the positioning of the desk may hinder ease of movement, visibility, or accessibility in the classroom. Additionally, 50 percent of respondents had concerns regarding the size/dimensions of the teacher's desk, which could imply that the desk was

not be adequate in size. These two aspects emphasize the need for a practical arrangement of the teacher's desk to optimize the teaching environment.

Findings in relation to design considerations for teacher's chair: The findings in the table highlighted that 51.25 percent of respondents experienced high extent of problem about the aesthetics of the teacher's chair, indicating that its design and appearance was not be visually appealing or conducive to creating a pleasant classroom environment. Additionally, 44 percent of respondents reported problems with the overall comfort extent of the teacher's chair to a high extent. This suggests that many teachers find the chair uncomfortable, which can significantly affect their ability to teach effectively for long periods. These concerns point to the need for more comfortable and visually appealing teacher chairs that support both functionality and classroom aesthetics.

Findings in relation to design considerations for student's desk/bench: The findings in the table show that 52.5 percent of respondents expressed high extent of problems with the overall comfort extent of the student's desk/bench, indicating that the current design may not be comfortable enough for students to sit and focus effectively during long periods of use. Additionally, 48.75 percent of respondents also reported problems with the size and dimensions of the desks to a high extent, suggesting that the current desk sizes may not be suitable for students' needs. These problems highlight the necessity of providing well-designed, appropriately sized, and more comfortable desks to enhance students' learning experiences.

Findings in relation to design considerations for storage unit: The findings in the table highlight that 55 percent of respondents faced significant problems with the placement and arrangement of the storage unit, suggesting that the storage units were poorly positioned or inconveniently located within the classroom. Additionally, 45 percent of respondents also experienced a high extent of problems with the aesthetics of the storage unit, indicating that its design or appearance did not positively contribute to the classroom's overall look and feel.

Table 8: Distribution of the respondents according to their extent of problems experienced regarding blackboard and bulletin board

	Respondents (n=80)					
	To High Extent		To Moderate Extent		To Low Extent	
	f	%	*f*	%	*f*	%
Design Consideration for Blackboard						
Placement/ arrangement	45	56.25	21	26.25	14	17.5
Quantity/ Numbers	19	23.75	10	12.5	51	63.75
Size/ Dimensions	31	38.75	23	28.75	26	32.5
Material/ Finish	11	13.75	23	28.75	46	57.5
Accessibility	38	47.5	14	17.5	28	35
Maintenance/ Present condition	32	40	21	26.25	27	33.75
Overall Comfort Level	32	40	43	53.75	5	6.25
Design Consideration for Bulletin board						
Placement/ arrangement	42	52.5	30	37.5	8	10
Quantity/ Numbers	21	26.25	9	11.25	50	62.5
Size/ Dimensions	38	47.5	18	22.5	24	30
Material/ Finish	10	12.5	8	10	62	77.5
Accessibility	18	22.5	25	31.25	37	46.25
Maintenance/ Present condition	33	41.25	23	28.75	24	30
Overall Comfort Level	21	26.25	33	41.25	26	32.5

Findings in relation to design considerations for blackboard: The findings in the above table show that 56.25 percent of respondents expressed concerns about the placement and arrangement of the blackboard to a high extent of problem, suggesting that its positioning was not be optimal for visibility and accessibility. Additionally, 47.5 percent of respondents reported problems with the accessibility of the blackboard, indicating that its location might hinder ease of use for teachers and students. These findings highlight the need for better placement and improved accessibility of blackboards to enhance the classroom learning experience.

Findings in relation to design considerations for bulletin board: The findings in the table indicated that 52.5 percent of respondents reported problems with the placement and

arrangement of the bulletin board to a high extent, suggesting that its current positioning may not be optimal for visibility and accessibility. Additionally, 47.5 percent of respondents expressed concerns about the size and dimensions of the bulletin board, implying that it may not be large enough to effectively display necessary information. These findings highlight the need for better placement and appropriately sized bulletin boards to improve their functionality and visibility in the classroom.

Table 9: Distribution of the respondents according to their extent of problems experienced regarding door, window and ventilation

	Respondents (n=80)					
	To High Extent		To Moderate Extent		To Low Extent	
	f	%	*f*	%	*f*	%
Design Consideration for Door						
Placement/ arrangement	23	28.75	21	26.25	36	45
Quantity/ Numbers	21	26.25	32	40	27	33.75
Size/ Dimensions	27	33.75	18	22.5	35	43.75
Material/ Finish	38	47.5	32	40	10	12.5
Ease of Use/ operability	28	35	12	15	40	50
Safety/ security	21	26.25	20	25	39	48.75
Maintenance/ Present condition	31	38.75	25	31.25	24	30
Aesthetics	36	45	32	40	12	15
Overall Comfort Level	38	47.5	39	48.75	3	3.75
Design Consideration for Window						
Placement/ arrangement	43	53.75	23	28.75	14	17.5
Quantity/ Numbers	11	13.75	12	15	57	71.25
Size/ Dimensions	34	42.5	19	23.75	27	33.75
Material/ Finish	31	38.75	29	36.25	20	25
Ease of Use/ operability	22	27.5	16	20	42	52.5
Safety/ security	23	28.75	12	15	45	56.25
Maintenance/ Present condition	31	38.75	27	33.75	22	27.5
Aesthetics	33	41.25	26	32.5	21	26.25
Overall Comfort Level	30	37.5	28	35	22	27.5

	Respondents (n=80)					
	To High Extent		To Moderate Extent		To Low Extent	
	f	%	f	%	f	%
Design Consideration for Ventilation						
Placement/ arrangement	38	47.5	29	36.25	13	16.25
Quantity/ Numbers	23	28.75	33	41.25	24	30
Size/ Dimensions	23	28.75	21	26.25	36	45
Material/ Finish	21	26.25	23	28.75	36	45
Ease of Use/ operability	11	13.75	8	10	61	76.25
Safety/ security	19	23.75	11	13.75	50	62.5
Maintenance/ Present condition	29	36.25	32	40	19	23.75
Aesthetics	23	28.75	22	27.5	35	43.75
Overall Comfort Level	25	31.25	23	28.75	32	40

Findings in relation to design considerations for door: The findings indicated that a little less than one half 47.5 percent of respondents experienced high extent of problem regarding the material/finish and overall comfort extent of the door, highlighting problems related to its quality. Additionally, 45 percent of respondents were concerned with the aesthetics, suggesting that the door's design or appearance was not at all visually appealing.

Findings in relation to design considerations for window: The data revealed that 53.75 percent of respondents faced high extent of problem about the placement and arrangement of the window, suggesting that improper positioning affected the natural light and ventilation, impacting the overall classroom environment. Additionally, 41.25 percent of respondents also felt that the aesthetics of the window was not proper, emphasizing the importance of a visually appealing and well-integrated design.

Findings in relation to design considerations for ventilation: The data reflected that 47.5 percent of respondents had concerns about the placement of ventilation, as improper window positioning affected airflow. Additionally, 36.25 percent reported problems with ventilation maintenance, suggesting a need for repairs or upgrades. These findings emphasize the importance of proper placement and upkeep to improve classroom air quality and comfort.

C. **Accessories/Decorative Elements:** The findings reflected the extent of problems experienced by teachers regarding accessories/decorative elements in all 5 municipal schools.

Table 10: Distribution of the respondents according to their extent of problems experienced regarding wall clock and calendar

	Respondents (n=80)					
	To High Extent		To Moderate Extent		To Low Extent	
	f	%	*f*	%	*f*	%
Design Consideration for Wall clock						
Placement/ arrangement	44	55	29	36.25	7	8.75
Quantity/ Numbers	9	11.25	11	13.75	60	75
Size/ Dimensions	36	45	21	26.25	23	28.75
Design Consideration for Calendar						
Placement/ arrangement	38	47.5	25	31.25	17	21.25
Quantity/ Numbers	10	12.5	8	10	62	77.5
Size/ Dimensions	32	40	29	36.25	19	23.75

Findings in relation to design considerations for wall clock: The findings in the table indicated that 55 percent of respondents identified problems with the placement and arrangement of the wall clock in the classroom. This suggests that the current positioning was not be optimal for easy visibility or use. Additionally, 45 percent of respondents were concerned about the size and dimensions of the wall clock, implying that the clock was either very small to be seen clearly from all areas of the room.

Findings in relation to design considerations for calendar: The findings from the table shows that 47.5 percent of respondents identified problems with the placement and arrangement of the calendar, suggesting that its location may not be suitable for visibility. Additionally, 40 percent of respondents faced problems with the size and dimensions, indicating that the calendar may be too small or not appropriately scaled for effective use.

D. Artificial light and Fan: The data was reflecting the extent of problems experienced by teachers regarding lighting and fan in all 5 municipal schools.

Table 11: Distribution of the respondents according to their extent of problems experienced regarding artificial light and fan

	Respondents (n=80)					
	To High Extent		**To Moderate Extent**		**To Low Extent**	
	f	**%**	*f*	**%**	*f*	**%**
Design Consideration for Artificial light						
Placement/ arrangement	45	56.25	23	28.75	12	15
Quantity/ Numbers	31	38.75	32	40	17	21.25
Size/ Dimensions	11	13.75	21	26.25	48	60
Maintenance/ Present condition	23	28.75	26	32.5	31	38.75
Overall Comfort Level	23	28.75	32	40	25	31.25
Design Consideration for Fan						
Placement/ arrangement	44	55	31	38.75	5	6.25
Quantity/ Numbers	48	60	29	36.25	3	3.75
Size/ Dimensions	21	26.25	19	23.75	40	50
Maintenance/ Present condition	30	37.5	32	40	18	22.5
Overall Comfort Level	27	33.75	23	28.75	30	37.5

Findings in relation to design considerations for artificial light: The findings from the table show that 56.25 percent of respondents experienced high extent of problem regarding the placement and arrangement of the artificial light, suggesting that improper positioning may affect the distribution of light, potentially leading to poorly lit areas within the classroom. Additionally, 38.75 percent of respondents were concerned about the quantity and numbers of artificial light, indicating an insufficient number of lights could result in inadequate illumination, making the classroom environment less conducive to learning.

Findings in relation to design considerations for fan: The table reflected that 60 percent of respondents reported that there were insufficient number of fans which lead to inadequate air circulation and discomfort in the classroom. Additionally, 55 percent of respondents also reported that the placement and arrangement of the fans was not proper, which hindered the airflow, affecting comfort extents in the classroom.

2. **Digital Infrastructure**

    A. **Digital devices:** The data reflected the extent of problems experienced by teachers regarding digital devices of all 5 municipal schools.

Table 12: Distribution of the respondents according to their extent of problems experienced regarding Digital devices

	Respondents (n=80)					
	To High Extent		To Moderate Extent		To Low Extent	
	f	%	*f*	%	*f*	%
Design Consideration for Projector						
Placement/ arrangement	32	40	21	26.25	27	33.75
Ease of Use/ operability	11	13.75	9	11.25	60	75
Maintenance/ Present condition	29	36.25	33	41.25	18	22.5
Overall Comfort Level	22	27.5	21	26.25	37	46.25
Design Consideration for Projector screen						
Placement/ arrangement	32	40	23	28.75	25	31.25
Ease of Use/ operability	30	37.5	10	12.5	40	50
Maintenance/ Present condition	21	26.25	23	28.75	36	45
Overall Comfort Level	18	22.5	12	15	50	62.5
Design Consideration for Television						
Placement/ arrangement	22	27.5	19	23.75	39	48.75
Ease of Use/ operability	9	11.25	11	13.75	60	75
Maintenance/ Present condition	28	35	31	38.75	21	26.25
Overall Comfort Level	21	26.25	30	37.5	29	36.25
Design Consideration for Speaker						
Placement/ arrangement	31	38.75	21	26.25	28	35
Ease of Use/ operability	10	12.5	9	11.25	61	76.25
Maintenance/ Present condition	21	26.25	30	37.5	29	36.25
Overall Comfort Level	33	41.25	12	15	35	43.75
Design Consideration for CCTV camera						
Placement/ arrangement	30	37.5	21	26.25	29	36.25
Ease of Use/ operability	12	15	10	12.5	58	72.5
Maintenance/ Present condition	12	15	23	28.75	45	56.25
Overall Comfort Level	27	33.75	21	26.25	32	40

Findings in relation to design considerations for projector: The data indicated that 40 percent of respondents experienced high extent of problem regarding the placement and arrangement of the projector, suggesting that improper positioning may affect its visibility and effectiveness in the classroom. Additionally, 36.25 percent of respondents raised concerns about the maintenance and present condition, pointing to potential problems like wear and tear that could hinder the projector's functionality.

Findings in relation to design considerations for projector screen: The table shows that 40 percent of respondents faced problems with the placement of the projector screen, indicating that its positioning may not be optimal for clear visibility. Additionally, 37.5 percent reported difficulties with its ease of use and operability, suggesting that adjustments or improvements are needed to enhance functionality. These findings highlight the need for better placement and user-friendly projector screens to improve classroom learning.

Findings in relation to design considerations for television: The findings reflected that 27.5 percent of respondents faced high extent of problem regarding with the Placement/ arrangement of the television, suggesting it may not be ideal for clear viewing. Additionally, 35 percent experienced problems with its maintenance and present condition, implying a need for regular upkeep or upgrades. These problems highlight the importance of selecting appropriately sized televisions and ensuring proper maintenance for effective classroom use.

Findings in relation to design considerations for Speaker: The above table indicated that 41.25 percent of respondents experienced high extent of problem about the overall comfort extent of the speaker, suggesting that the sound system did not provide an optimal auditory experience.

Findings in relation to design considerations for CCTV camera: The above table indicated that 37.5 percent of respondents experienced high extent of problem regarding the placement and arrangement of the CCTV cameras, which suggests that improper positioning affected their coverage and effectiveness in monitoring the classroom. Additionally, 33.75 percent of respondents also reported concerns about the overall comfort extent with the CCTV camera, implying that the camera's presence or placement may cause discomfort for some.

B. **Electrical Fixture:** The data was reflected the extent of problems experienced by teachers regarding electrical fixture of all 5 municipal schools.

Table 13: Distribution of the respondents according to their extent of problems experienced regarding Electrical Fixtures

	Respondents (n=80)					
	To High Extent		To Moderate Extent		To Low Extent	
	f	%	*f*	%	*f*	%
Design Consideration for Switch board						
Placement/ arrangement	39	48.75	21	26.25	20	25
Quantity/ Numbers	31	38.75	29	36.25	20	25
Ease of Use/ operability	9	11.25	10	12.5	61	76.25
Safety/ security	10	12.5	12	15	58	72.5
Maintenance/ Present condition	29	36.25	21	26.25	30	37.5
Overall Comfort Level	21	26.25	29	36.25	30	37.5
Design Consideration for HDMI cable						
Placement/ arrangement	39	48.75	21	26.25	20	25
Quantity/ Numbers	23	28.75	22	27.5	35	43.75
Ease of Use/ operability	12	15	23	28.75	45	56.25
Safety/ security	9	11.25	10	12.5	61	76.25
Maintenance/ Present condition	18	22.5	17	21.25	45	56.25
Overall Comfort Level	20	25	12	15	48	60
Design Consideration for LAN cable						
Placement/ arrangement	29	36.25	28	35	23	28.75
Quantity/ Numbers	20	25	18	22.5	42	52.5
Ease of Use/ operability	10	12.5	7	8.75	63	78.75
Safety/ security	12	15	10	12.5	58	72.5
Maintenance/ Present condition	21	26.25	10	12.5	49	61.25
Overall Comfort Extent	16	20	10	12.5	54	67.5

Findings in relation to design considerations for switch board: The table shows that 48.75 percent of respondents experienced high extent of problem about the placement and arrangement of the switch board, suggesting that its positioning could affect accessibility and convenience. The second-highest concern, 38.75 percent, was related to the quantity

and numbers of extension boards, indicating that an insufficient number could lead to a lack of proper connectivity and potential overcrowding of power sources. These findings highlight the importance of appropriate placement and adequate provision of switch boards to ensure a safe and functional classroom environment.

Findings in relation to design considerations for HDMI port: The table revealed that 48.75 percent of respondents experienced high extent of problem about the placement and arrangement of the HDMI port, suggesting that its positioning is critical for ease of access and effective use. Additionally, 28.75 percent of respondents highlighted concerns about both the quantity and numbers of HDMI ports and their accessibility, indicating that insufficient ports or difficult-to-reach locations could limit connectivity and cause inconvenience. These concerns underscore the importance of strategically placing a sufficient number of easily accessible HDMI ports to enhance user experience and functionality in the classroom.

Findings in relation to design considerations for LAN cable: The table revealed that 36.25 percent of respondents experienced high extent of problem about the placement and arrangement of the LAN connection, suggesting that its positioning plays a key role in accessibility and efficient use. Additionally, 26.25 percent of respondents highlighted high extent of problems with accessibility and maintenance/present condition, which could impact the ease of connecting devices and affect the overall functionality.

Table 14: Weighted mean scores on the extent of problems experienced by teachers regarding existing design of classroom in selected municipal schools in Vadodara city

Sr. No.	Existing Classroom Interior design/ Features	Respondents (n = 80)
		Weighted Mean Score (3-1)
1.	Interior Design Aspects	
	A. Surface treatment	
	Wall	1.99
	Floor	1.92
	Ceiling	**2.14**
	B. Furniture	
	Teacher's desk	**2.22**
	Teacher's chair	1.99
	Student's desk/bench	**2.09**
	Storage unit	2.01
	Blackboard	1.85
	Bulletin board	1.81
	Door	2.0
	Window	1.96
	Ventilation	1.84
	C. Accessories/Decorative Elements	
	Wall clock	1.68
	Calendar	1.65
	D. Artificial light and Fan	
	Artificial light	1.69
	Fan	1.84
2.	Digital infrastructure	
	A. Digital Devices	
	Projector	1.59
	Projector screen	1.63
	Television	1.61
	Speaker	1.58
	CCTV camera	1.68
	B. Electrical Fixture	
	Switch board	1.72
	HDMI cable	1.60
	LAN cable	1.56

The computed weighted mean score for each interior design aspects on extent of problem faced by teachers revealed that teacher's desk 2.22, ceiling 2.14 and student's desk/bench 2.09 were highest amongst all. The score for LAN cable was found to have the lowest weighted mean score.

Section III: Opinion of teachers regarding existing design of classroom in selected Municipal Schools of Vadodara city.

This section aimed to assess the opinions of school teachers regarding the existing design of classrooms in selected municipal schools in Vadodara city. A set of 15 statements was developed, and responses were recorded using a 3-point Likert-type summated rating scale with response options as "Agree," "Neutral," and "Disagree," which were assigned scores of 3, 2, and 1, respectively. A higher score indicated a more favorable opinion of teachers regarding existing classroom design, reflecting a positive perception of its various aspects and vice-versa.
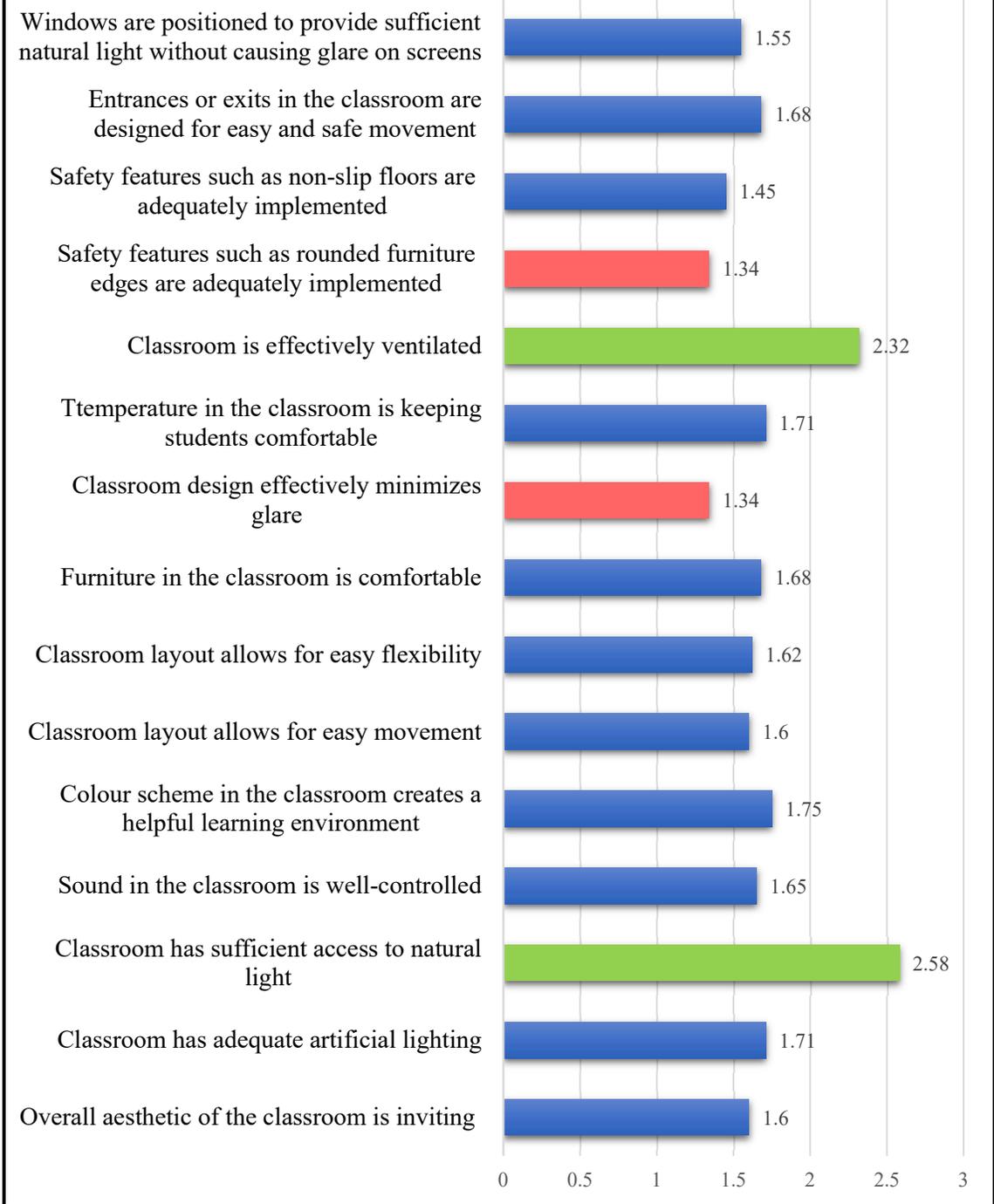
Table 15: Distribution of the respondents according to their opinion regarding existing design of classroom in selected Municipal Schools in Vadodara city

Sr. No.	Opinion of teachers regarding existing design of classroom	Respondents (n=80)						Weighted mean score (3-1)
		Agree		Neutral		Disagree		
		f	%	f	%	f	%	
1.	The overall aesthetic of the classroom is inviting for students.	9	11.25	30	37.5	41	51.25	1.6
2.	The classroom has adequate artificial lighting.	13	16.25	31	38.75	36	45	1.71
3.	The classroom has sufficient access to natural light.	37	46.25	21	26.25	22	27.5	2.58
4.	The sound in the classroom is well-controlled, making it quieter and reducing distractions.	16	20	20	25	44	55	1.65
5.	The colour scheme in the classroom creates a helpful learning environment.	24	30	25	31.25	31	38.75	1.75
6.	The classroom layout allows for easy movement.	10	12.5	28	35	42	52.5	1.6
7.	The classroom layout allows for easy flexibility.	11	13.75	28	35	41	51.25	1.62

8.	The furniture in the classroom is comfortable.	13	16.25	29	36.25	38	47.5	1.68
9.	The classroom design effectively minimizes glare.	21	26.25	31	38.75	28	35	1.34
10.	The temperature in the classroom is keeping students comfortable.	11	13.75	35	43.75	34	42.5	1.71
11.	The classroom is effectively ventilated, ensuring good air circulation.	22	27.5	30	37.5	28	35	2.32
12.	Safety features such as rounded furniture edges are adequately implemented in the classroom.	9	11.25	26	32.5	45	56.25	1.34
13.	Safety features such as non-slip floors are adequately implemented in the classroom.	21	26.25	28	35	31	38.75	1.45
14.	The entrances or exits in the classroom are designed for easy and safe movement.	16	20	23	28.75	41	51.25	1.68
15.	The windows are positioned to provide sufficient natural light without causing glare on screens.	17	21.25	26	32.5	37	46.25	1.55
16.	The overall aesthetic of the classroom is inviting for students.	9	11.25	30	37.5	41	51.25	1.7
	Total Weighted Mean							1.70

The findings revealed that natural lighting and ventilation were rated as most favorable opinion of classroom design. Nearly 46.25 percent of teachers agreed that classrooms receive enough natural light, which improves visibility and creates a better learning environment. Similarly, 27.5 percent of teachers felt that classrooms have good air circulation, ensuring fresh air and a comfortable atmosphere. These aspects contribute to a healthier and more effective learning space, though other areas of classroom design may need improvement.

Weighted mean score on opinion regarding existing design of classroom in selected municipal schools in Vadodara city.

| Item	Score
Windows are positioned to provide sufficient natural light without causing glare on screens	1.55
Entrances or exits in the classroom are designed for easy and safe movement	1.68
Safety features such as non-slip floors are adequately implemented	1.45
Safety features such as rounded furniture edges are adequately implemented	1.34
Classroom is effectively ventilated	2.32
Ttemperature in the classroom is keeping students comfortable	1.71
Classroom design effectively minimizes glare	1.34
Furniture in the classroom is comfortable	1.68
Classroom layout allows for easy flexibility	1.62
Classroom layout allows for easy movement	1.6
Colour scheme in the classroom creates a helpful learning environment	1.75
Sound in the classroom is well-controlled	1.65
Classroom has sufficient access to natural light	2.58
Classroom has adequate artificial lighting	1.71
Overall aesthetic of the classroom is inviting	1.6

Figure 3: Weighted mean scores on the opinion regarding existing design of classroom in selected Municipal Schools in Vadodara city

The weighted mean scores of teachers' opinions on the existing classroom design highlight key aspects of the learning environment. Sufficient access to natural light received the highest weighted mean score, indicating its importance as perceived by the respondents. Additionally, the findings revealed that good air circulation had the second-highest weighted mean score, emphasizing its significance in creating a comfortable classroom setting.

Table 16: Opinion of teachers regarding existing design of classroom

Sr. No.	Opinion of teachers regarding existing design of classroom	Range of score	Respondents (n = 80)	
			f	%
1.	Highly favorable	35 – 45	36	45
2.	Moderately favourable	25 - 34	27	33.75
3.	Unfavorable	15 - 24	17	21.25

The findings from Table 20 revealed that 45 percent of respondents had a highly favorable opinion regarding the existing design of classrooms in selected municipal schools of Vadodara city. While 33.75 percent of respondents expressed a moderately favorable opinion and the remaining 21.25 percent of respondents had unfourable opinion. This indicated that although a significant portion of teachers view the classroom design positively, there is still room for improvement to enhance the overall interior aspects in the classrooms.
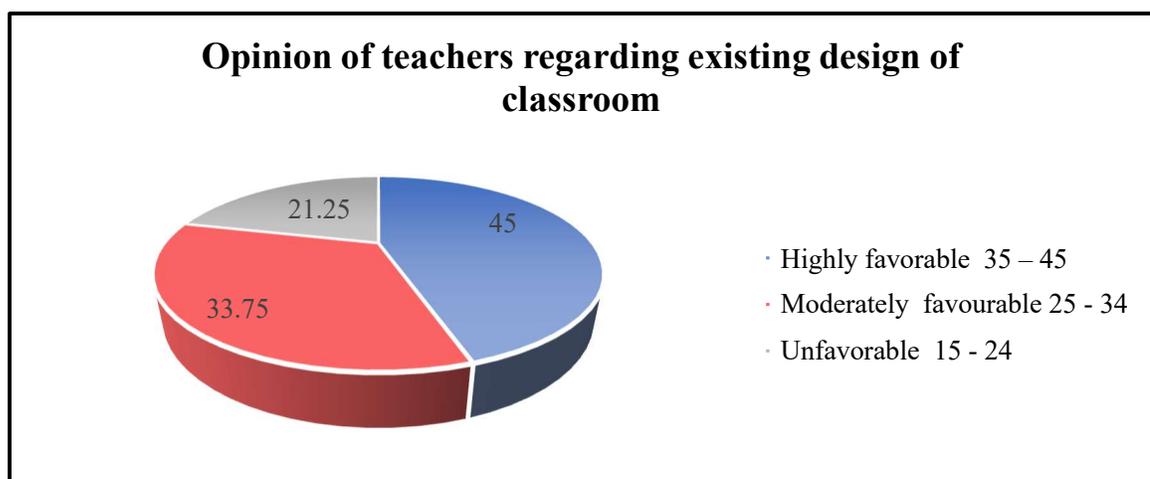
Figure 4: Percentage distribution of respondents according to the Opinion of teachers regarding existing design of classroom

Section IV: Design Development of the selected municipal school in Vadodara city.

Phase I: Details of interior design aspects of a classroom in selected municipal schools of Vadodara city as recorded in observation sheet.

A. Background information of the school

Table 17: Distribution of the background information regarding existing status of the school

	School 1	School 2	School 3	School 4	School 5
Location	Vadsar	Akota	Harni	Sama	Chani
Ownership of the school	VMC (Vadodara Municipal Corporation)				
Year of establishment	126 years	75 years	15 years	12 years	13 years
Working hours of the school	11 hours	10 hours	11 hours	10 hours	10 hours

The table highlights key details about five VMC-run primary schools located across Vadodara, including School 1, School 2, School 3, School 4, and School 5. These schools are situated in Vadsar, Akota, Harni-Warsiya, Sama, and Chani, ensuring accessibility in diverse city regions.

School 1 is the oldest, with a legacy of 126 years, while the others range between 12 to 75 years of establishment. Working hours vary slightly, with most schools operating for 10 to 11 hours daily. The schools reflect the public education model managed by Vadodara Municipal Corporation, emphasizing equitable access to education.

B. General information of the classroom

Table 18: Distribution of the general information regarding existing design of the classroom

	School 1	School 2	School 3	School 4	School 5
Classroom details					
Direction	West	East	West	North	East
Floor l	SF*	FF*	GF*	SF	FF
Shape of classroom	Square	Square	Rectangle	Rectangle	Rectangle
Size of classroom					
l x b x h (in feet/inches)	18'7" x 18'5' x 9'6"	18'6" x 18'6" x 9'9"	17'8" x 19'0" x 9'9"	17'0" x 18'2" x 9'6"	18'0" x 17'6" x 9'8"
Total area (in square feet)	316.458 sq ft	342.25 sq ft	335.73 sq ft	308.83 sq ft	315 sq ft

*First Floor *Second Floor *Third Floor
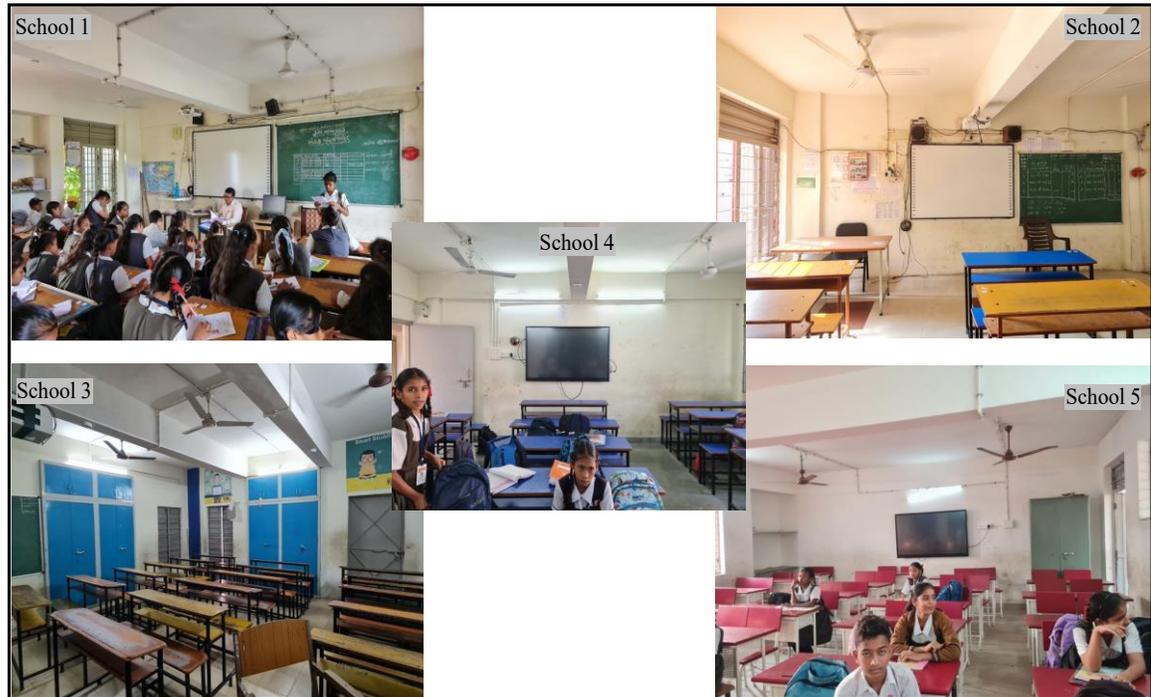
Plate 1: Existing design of the classroom of 5 Vadodara Municipal Schools

The table provided detailed general information about classroom in five municipal schools. It highlights key aspects such as classroom direction, floor location, shape, size, and total area.

Classroom directions vary across schools, with west-facing classrooms in School 1 and School 3, east-facing ones in School 2 and School 5, and a north-facing classroom in School 4. The classrooms are located on different floors ground floor (GF) for School 3, first floor (FF) for School 2 and School 5, and second floor (SF) for School 1 and School 4.

Most classrooms are rectangular, except School 2, which has a square layout. The sizes of the classrooms, measured in length, breadth, and height (in feet and inches), range from 17'0" x 18'2" x 9'6" in School 4 to 18'6" x 18'6" x 9'9" in School 2. Total areas vary slightly, with School 2 having the largest classroom (342.25 sq. ft.), followed by School 3 (335.73 sq. ft.), School 1 (316.46 sq. ft.), School 5 (315 sq. ft.), and School 4 (308.83 sq. ft.).

C. Interior design aspects of the classroom: an observation sheet was prepared to document the various interior design aspects of classroom. They're included surface treatment of ceiling, wall and floor, furniture and furnishings, interior accessories/ decorative elements and lightings and fan.

Table 19: Distribution of the information regarding existing design of classroom wall

Wall	School 1	School 2	School 3	School 4	School 5
Material	Brick & Plaster	Brick & Plaster	Brick & Plaster	Brick & Plaster	Brick & Plaster
Finish	Paint	Paint	Paint	Paint	Paint
Colour	Off white	Off white	Off white	Off white	Off white
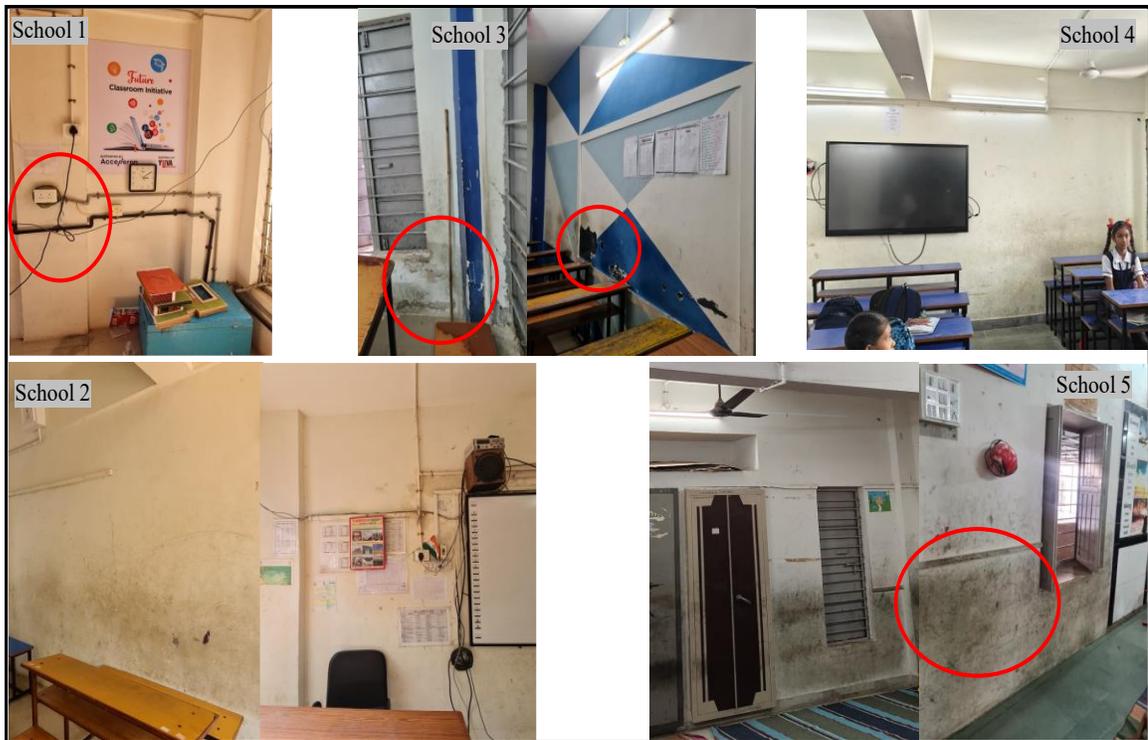
Plate 2: Existing design of the classroom wall of 5 Vadodara Municipal Schools

The above table provides information on classroom walls across five schools, revealing several concerning problems. While all schools have brick and plaster walls finished with off-white paint, poor maintenance has led to open wiring, cracks, dampness, and stains.

School 1 and School 2 have exposed electrical wiring, posing a serious safety risk of shocks or fire hazards. School 3 and School 5 show cracks and peeling paint, indicating structural weakness and neglect. Dampness and black mold are visible in School 3, School 4, and School 5, which can lead to health problems like respiratory problems and allergies. Additionally, School 5 has heavily stained walls, making the classrooms look unhygienic.

Table 20: Distribution of the information regarding existing design of classroom floor

Floor	School 1	School 2	School 3	School 4	School 5
Material	Tiles	Tiles	Tiles	Kota stone	Tile
Colour	Off white & Brown	Off white & Brown	Off white & Brown	Design	Off white

Plate 3: Existing design of the classroom floor of 5 Vadodara Municipal Schools

The classroom floors in all five schools primarily consist of ceramic tiles, with a mix of beige and brown colors arranged in a checkered or patterned design. The overall condition of the floors appears to be average, with visible dirt accumulation, scratches, and some unevenly placed tiles.

One of the major problems observed is the lack of skirting along the walls in most classrooms. Skirting serves both an aesthetic and functional purpose, protecting walls from damage due to mopping and movement of furniture. The absence of skirting leads to direct contact between the walls and the floor, making them more prone to dirt accumulation, scuff marks, and potential damage.

Additionally, in some schools, particularly in School 4 and School 5, there are noticeable gaps and misalignment in the tiling. This could lead to further deterioration over time and may pose a tripping hazard for students and staff. Some areas also have visibly worn-out tiles, indicating the need for regular maintenance and replacement in damaged sections.

Table 21: Distribution of the information regarding existing design of classroom ceiling

| Ceiling	School 1	School 2	School 3	School 4	School 5
Material	RCC	RCC	RCC	RCC	RCC
Finish	Paint	Paint	Paint	Paint	Paint
Colour	Off white	Off white	Off white	Off white	Off white

Plate 4: Existing design of the classroom ceiling of 5 Vadodara Municipal Schools

The above table shows that all five schools have RCC (Reinforced Cement Concrete) ceilings with off-white paint. However, exposed electrical wiring, especially in School 1 and School 5 Schools, posing safety risks. Stains, discoloration, and uneven surfaces in some schools suggest poor maintenance and possible water leakage. The old ceiling fans and lights appear loosely fitted, increasing hazards. Overall, the ceilings look neglected, requiring wiring fixes, repainting, and regular maintenance to improve safety and aesthetics. Overall, the condition is average, with cracks and damp patches observed.

Table 22: Distribution of the information regarding existing design of teacher's desk

Teacher's desk	School 1	School 2	School 3	School 4	School 5
Quantity	1	2	2	1	2
Base Material	Engineered Wood	Wood and Metal	Wood and Metal	Engineered Wood	Wood and Metal
Finish Material	Laminate	Laminate	Laminate	Laminate	Laminate
Colour	Off – White	Brown	Brown	Off – White	Brown
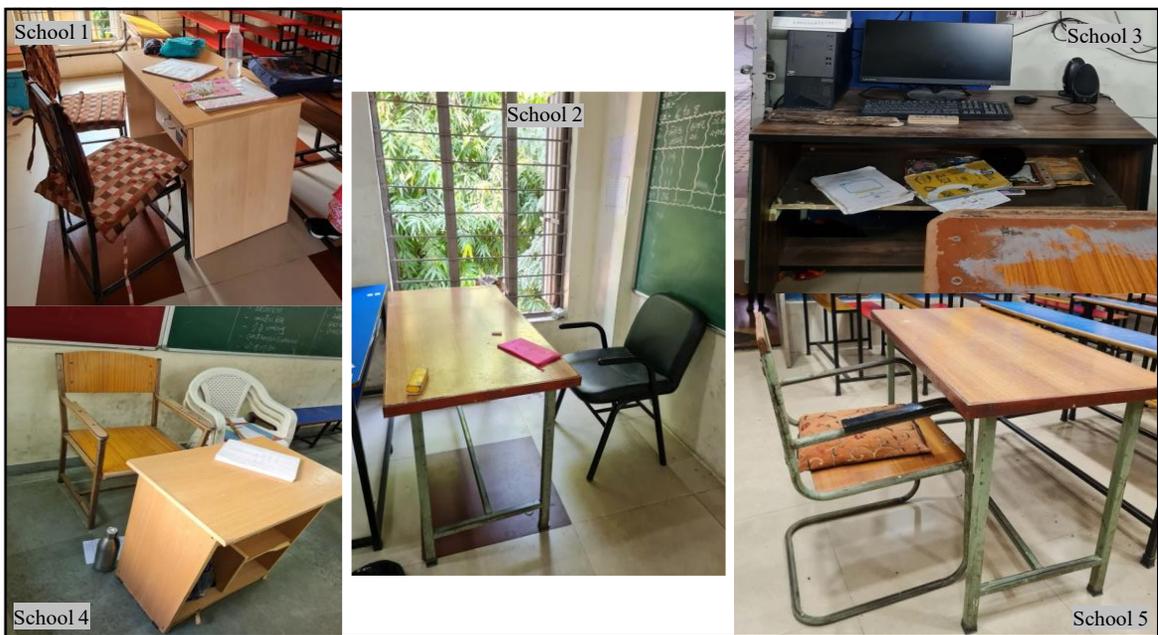
Plate 5: Existing design of the teacher's desk and chair of 5 Vadodara Municipal Schools

The teacher's desks in the five schools vary in material and condition, with some made of engineered wood and others combining wood and metal. While all have a laminate finish, the desks in School 2 and School 5 are in poor condition, showing visible wear and instability. Additionally, several desks lack drawers, limiting storage space for teaching materials. Mismatched desk and chair designs in some schools further contribute to discomfort and inefficiency. To enhance functionality, desks should be repaired or replaced,

storage options should be included, and ergonomic standards should be maintained for improved usability.

Table 23: Distribution of the information regarding existing design of teacher's chair

Teacher's chair	School 1	School 2	School 3	School 4	School 5
Quantity	2	1	2	1	2
Base Material	Metal	Metal	Plastic	Wooden	Plastic
Base colour	Black	Black	Brown	Wooden texture	Brown
Furnishing Material	Leather and Cotton	Leather	-	Laminate and paint	-
Furnishing colour	Shades of brown	Black	-	Laminate	-

The teacher's chairs in the five schools exhibit variations in material, design, and comfort levels. Most chairs have a metal or plastic base, while School 4 features a wooden chair. The color scheme varies from black and brown to wooden textures, with some chairs having leather or cotton furnishing. However, several chairs, particularly in School 3 and School 5, lack cushioning and armrests, making them less ergonomic for prolonged use. The overall condition of the chairs is mostly average, with School 2 having a relatively better-maintained chair. The lack of proper hand support and cushioning in some schools may lead to discomfort for teachers. To improve comfort and durability, schools should consider providing well-padded chairs with armrests, ensuring better seating conditions for teachers.

Table 24: Distribution of the information regarding existing design of Student Bench

Student Bench	School 1	School 2	School 3	School 4	School 5
Quantity	16	18	18	16	17
Base Material	Wood and Metal	Wood and Metal	Wood and Metal	Wood and Metal	Wood and Metal
Finish Material	Laminate	Polished	Polished	Laminate	Laminate
Colour	Red	Brown	Brown	Blue	Red
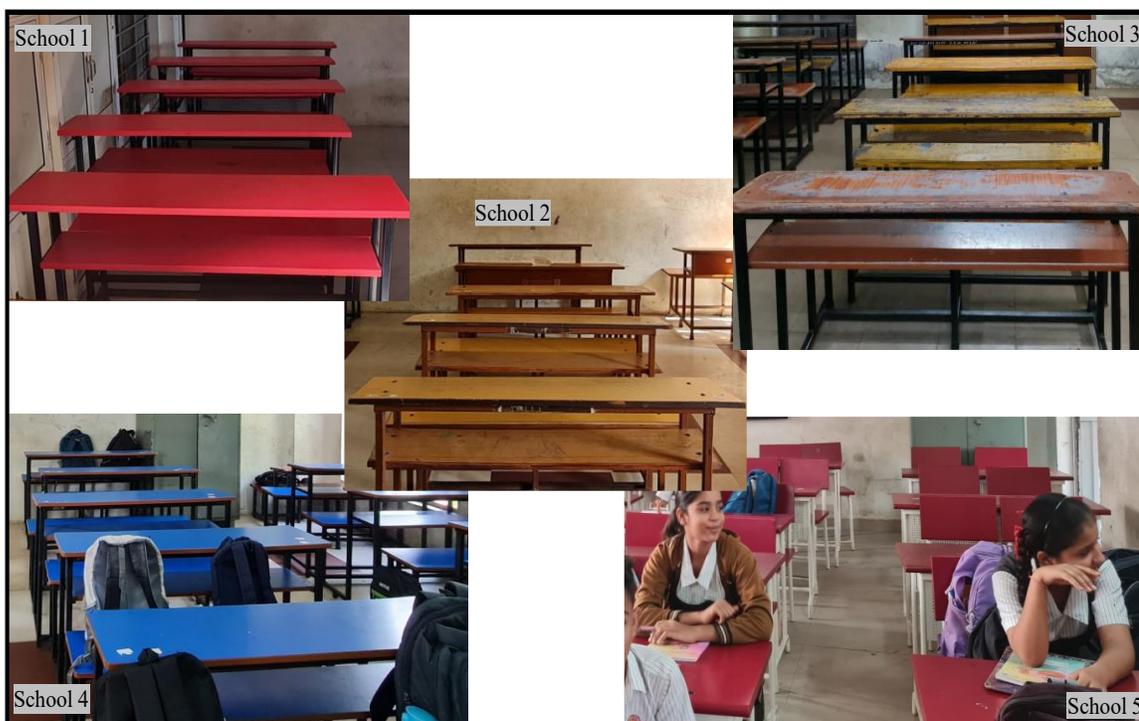
Plate 6: Existing design of the student bench of 5 Vadodara Municipal Schools

The student benches across different schools are primarily made of wood and metal, providing durability and support. School 1, School 4, and School 5 have benches with a laminate finish, while School 2 and School 3 have polished wooden surfaces. The color of the benches varies, with red in School 1 and School 5, blue in School 4, and brown in School 2 and School 3 . The condition of the benches is generally good in most schools, except for School 2 and School 3, where they appear to be in bad condition.

Table 25: Distribution of the information regarding existing design of Storage unit

| Storage unit	School 1	School 2	School 3	School 4	School 5
Base Material	Metal	ACP	Metal	Metal	Metal
Finish Material	Powder coating	Paint	Powder coating	Powder coating	Powder coating
Colour	Grey	Off – White	Blue	Grey	Grey

Plate 7: Existing design of the storage unit of 5 Vadodara Municipal Schools

The analysis of storage units across five schools reveals variations in material, finish, color, and condition. Most units are metal with a powder-coated finish, except for School 2, which is ACP (Aluminium Composite Panel) sheet with paint. However, visible rust suggests it may actually be metal, highlighting inconsistencies in material classification.

Several storage units have structural problems, such as excessive height, making access difficult. Some doors do not close properly, while others produce noise when opened and closed. The depth of certain storage units is also insufficient for storing larger items, limiting their functionality. Maintenance problems like rust, scratches, and chipped paint are evident, particularly in poorly rated units, indicating a need for regular upkeep. Standardizing material identification, condition assessment, and maintenance practices can enhance the durability and functionality of school storage units.

Blackboard:
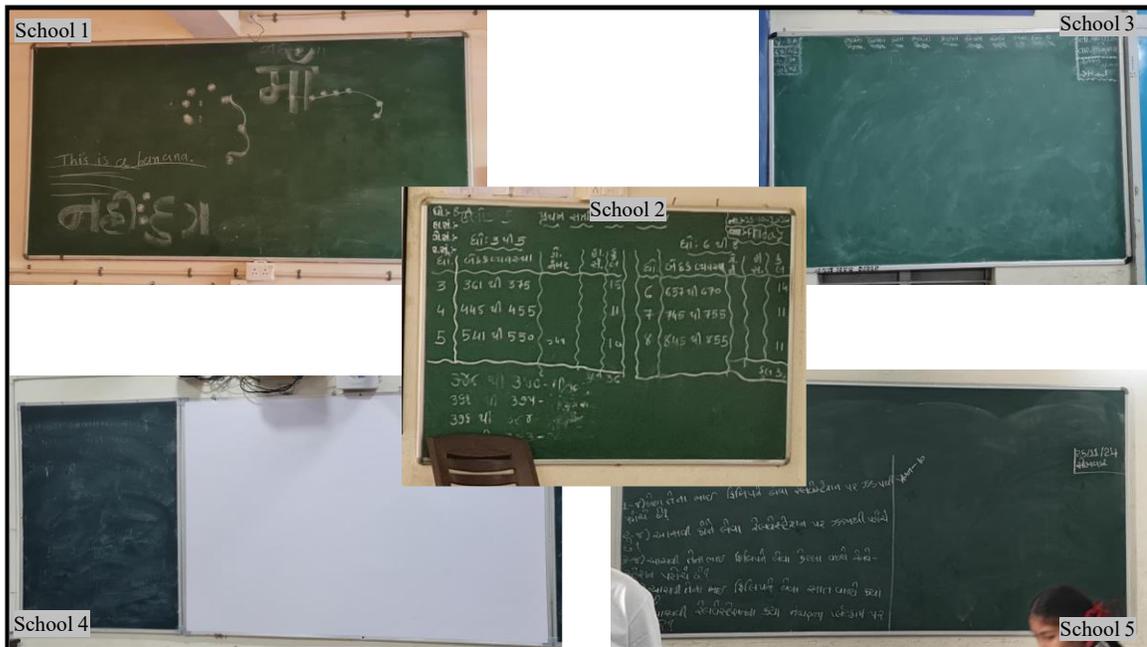
Plate 8: Existing design of the blackboard of 5 Vadodara Municipal Schools

The blackboards in the observed schools vary in material, maintenance, and usability. School 1, School 3, School 2, and School 5 primarily use traditional green chalkboards, while School 4 has a combination of a black chalkboard and a whiteboard.

Bulletin board:

Plate 9: Existing design of the bulletin board of 5 Vadodara Municipal Schools

The bulletin boards in the image are made of fabric-covered softboard with aluminum frames. They come in different colors like brown, blue, and red. Some boards have student artwork, science projects, and notices pinned on them, while others are empty. The condition of the boards varies; some appear well-used with pinned materials, while others are mostly blank. School 2 does not have a bulletin board.

Table 26: Distribution of the information regarding existing design of door, window and ventilation of School 1

	Size (L x H)	Quantity	Base Material	Finish Material	Safety Grill
Double door	3'11" x 6'6"	2	Metal	Powder coating	-
Window	3'11" x 5'-0"	2	Metal	Powder coating	Yes
Ventilation	3'11" x 1'2"	4	Metal	Powder coating	Yes

School 1 has two double metal doors measuring 3'11" x 6'6", finished with powder coating. The two metal windows, sized 3'11" x 5'0", also have a powder-coated finish and include safety grills for security. Additionally, the school features four ventilation openings, each 3'11" x 1'2", made of metal with a powder-coated finish, and equipped with safety grills to ensure proper airflow while maintaining security.

Table 27: Distribution of the information regarding existing design of door, window and ventilation of School 2

	Size (L x H)	Quantity	Base Material	Finish Material	Safety Grill
Double door	3'11" x 6'6"	2	Metal	Powder coating	-
Window	3'11" x 5'-0"	2	Metal	Powder coating	Yes
Ventilation	3'11" x 1'2"	4	Metal	Powder coating	Yes

School 2 has two double metal doors measuring 3'11" x 6'6", finished with powder coating. The two metal windows, sized 3'11" x 5'0", also feature a powder-coated finish and include safety grills for security. Additionally, the school has four ventilation openings, each 3'11" x 1'2", made of metal with a powder-coated finish, and fitted with safety grills to ensure

airflow while maintaining security. Proper maintenance is necessary to prevent deterioration and ensure long-term usability.

Table 28: Distribution of the information regarding existing design of door, window and ventilation of School 3

	Size (L x H)	Quantity	Base Material	Finish Material	Safety Grill
Double door	4'0" x 6'6"	1	Metal	Powder coating	-
Single door	2'10" x 6'6"	1	Metal	Powder coating	-
Window	3'2" x 5'-0"	2	Metal	Powder coating	Yes

School 3 has a single double metal door measuring 4'0" x 6'6" and a single metal door of 2'10" x 6'6", both finished with powder coating but. The school includes two metal windows, each 3'2" x 5'0", also powder-coated and fitted with safety grills for security. However, the school lacks dedicated ventilation openings, which may affect airflow and indoor air quality. Proper maintenance and possible ventilation improvements could enhance the learning environment.

Table 29: Distribution of the information regarding existing design of door, window and ventilation of School 4

|	Size (L x H)	Quantity	Base Material	Finish Material	Safety Grill
Single door	3'2" x 7'0"	2	Wooden	Powder coating	-
Window	4'6" x 4'-0"	2	Metal and Glass	Paint	Yes
Ventilation	4'6" x 1'2"	2	Metal and Glass	Paint	Yes

School 4 features two single wooden doors, each measuring 3'2" x 7'0", finished with powder coating. The school has two windows of 4'6" x 4'0", made of metal and glass, painted, and equipped with safety grills for security. Additionally, there are two ventilation

openings, each 4'6" x 1'2", constructed from metal and glass, painted, and also fitted with safety grills.

Table 30: Distribution of the information regarding existing design of door, window and ventilation of School 5

	Size (L x H)	Quantity	Base Material	Finish Material	Safety Grill
Double door	3'11" x 6'6"	2	Metal	Powder coating	-
Window	3'11" x 5'-0"	4	Metal	Powder coating	Yes
Ventilation	3'11" x 1'2"	2	Metal	Powder coating	Yes

School 5 features two double metal doors measuring 3'11" x 6'6", finished with powder coating. The school has four metal windows, each 3'11" x 5'0", also powder-coated and equipped with safety grills for added security. Additionally, two ventilation openings, sized 3'11" x 1'2", are made of metal with a powder-coated finish and include safety grills to ensure proper airflow. Regular upkeep is essential to maintain their durability and functionality.
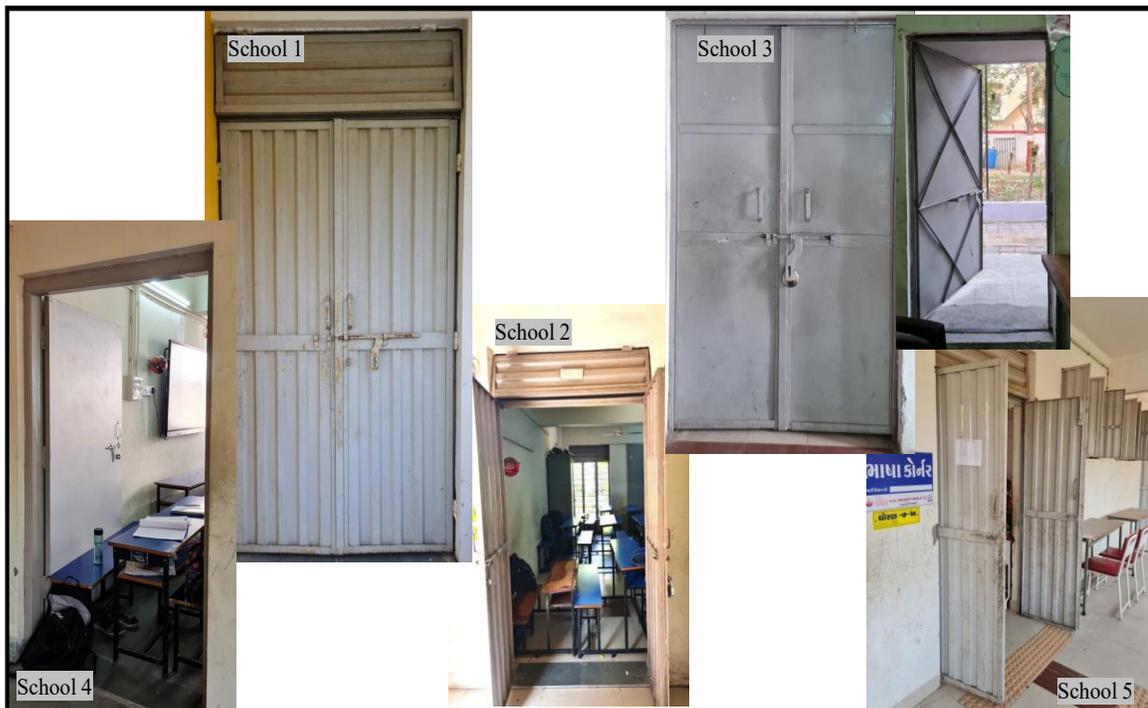
Plate 10: Existing design of the classroom doors of 5 Vadodara Municipal Schools

Plate 11: Existing design of the classroom windows of 5 Vadodara Municipal Schools

Plate 12: Existing design of the classroom ventilation of 5 Vadodara Municipal Schools

Interior accessories/ decorative elements: The research findings indicate that the classrooms observed have only basic accessories, with limited educational or decorative elements. The available accessories include small wall clocks, calendars, educational posters, religious photo frames, and handmade decorations, but these are neither uniform nor well-maintained across all schools.

Wall clocks are present in some classrooms but are generally too small, making it difficult for students to read the time from a distance. Calendars are also found in a few classrooms, but their placement is not always optimal for visibility. Some classrooms have educational posters, but they are minimal and do not significantly enhance the learning environment. Additionally, religious photo frames, handmade decorations, and general wall hangings are seen in a few classrooms, but their educational relevance is limited.

Overall, the lack of well-placed, engaging, and informative accessories suggests a need for improvement. Introducing larger, clearer wall clocks, more educational posters, interactive charts, and well-organized classroom decorations can create a more enriching and visually engaging learning environment for students.

Plate 13: Existing design of the classroom accessories of 5 Vadodara Municipal Schools

Source of lighting:

Natural light: The findings indicate that all the schools observed have good natural lighting through doors, windows, and proper ventilation. The classrooms are designed to allow ample daylight, reducing the need for artificial lighting during the day. This enhances visibility and creates a comfortable learning environment for students. Proper ventilation further contributes to a fresh and well-lit atmosphere, ensuring a healthy and productive educational space.

Artificial light: The research findings indicate that all the observed schools use fluorescent tube lights as their primary artificial lighting source. These tube lights are installed on ceilings or walls, ensuring even distribution of light across classrooms. Each classroom typically has 4 to 6 tube lights, providing sufficient illumination for students and teachers.

Plate 14: Existing design of the artificial light source of 5 Vadodara Municipal Schools

Fan: The research findings indicate that all classrooms in the observed schools are equipped with standard ceiling fans, typically four to five per classroom. These fans are installed at equal distances across the ceiling to ensure even air circulation.

The fans appear to be of basic design, with some showing signs of wear and tear. While they provide essential ventilation, their efficiency may vary based on maintenance and power availability.

Plate 15: Existing design of the fan of 5 Vadodara Municipal Schools

All five schools School 1, School 2, School 3, School 4 , and School 5 use digital devices to enhance learning. Each school is equipped with televisions, CCTV cameras for safety, projectors for interactive teaching, and computers for digital resources.

However, not all classrooms have speakers, and some that do have speakers that are too small to provide adequate audio coverage, making it difficult for students to hear clearly. Additionally, televisions in some classrooms are placed behind the students, causing visibility problems. These factors limit the effectiveness of the digital tools, highlighting the need for better placement and appropriately sized audio equipment.
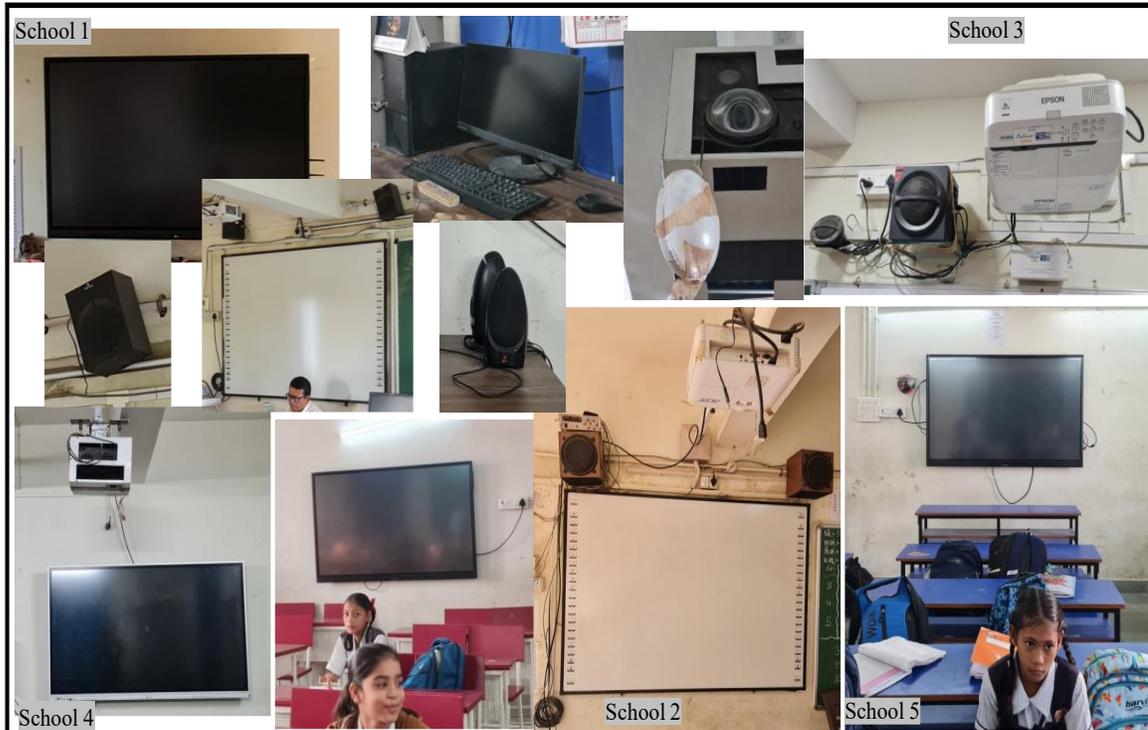
Plate 16: Existing status of the digital devices of 5 Vadodara Municipal Schools

E. Additional Interior Design Features for the Classroom

Most classrooms provide some flexibility in movement; however, problems with furniture placement impact accessibility. For example, in School 1, the overcrowded arrangement of benches reduced free movement, especially in the middle and back areas. in School 3, benches were placed too close to storage cabinets, making it difficult to open them without moving the furniture. Additionally, although classrooms typically have two doors for entry and exit, one door was often blocked by furniture, limiting accessibility and emergency evacuation routes. Ventilation was generally adequate, but in School 3 small windows restricted natural airflow. Lighting combines natural and artificial sources, but School 4 relied more on artificial lighting due to limited windows. While essential fire safety features were present, enhancing furniture layout and ensuring clear pathways would improve both comfort and accessibility.
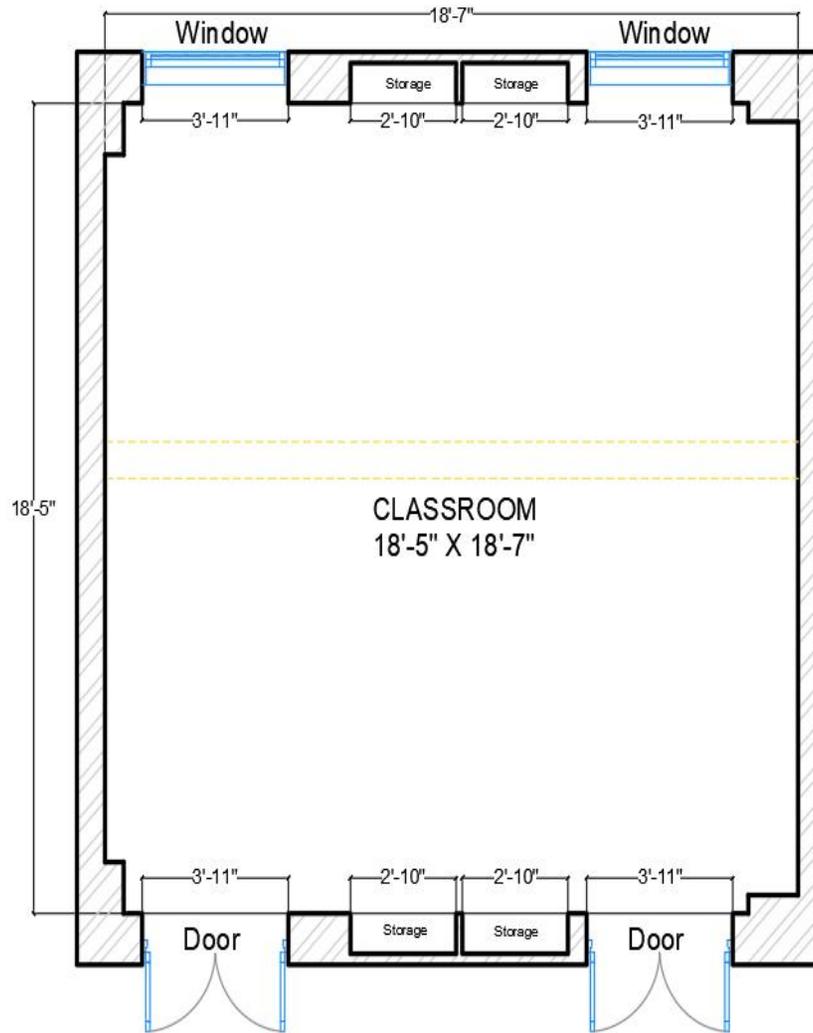
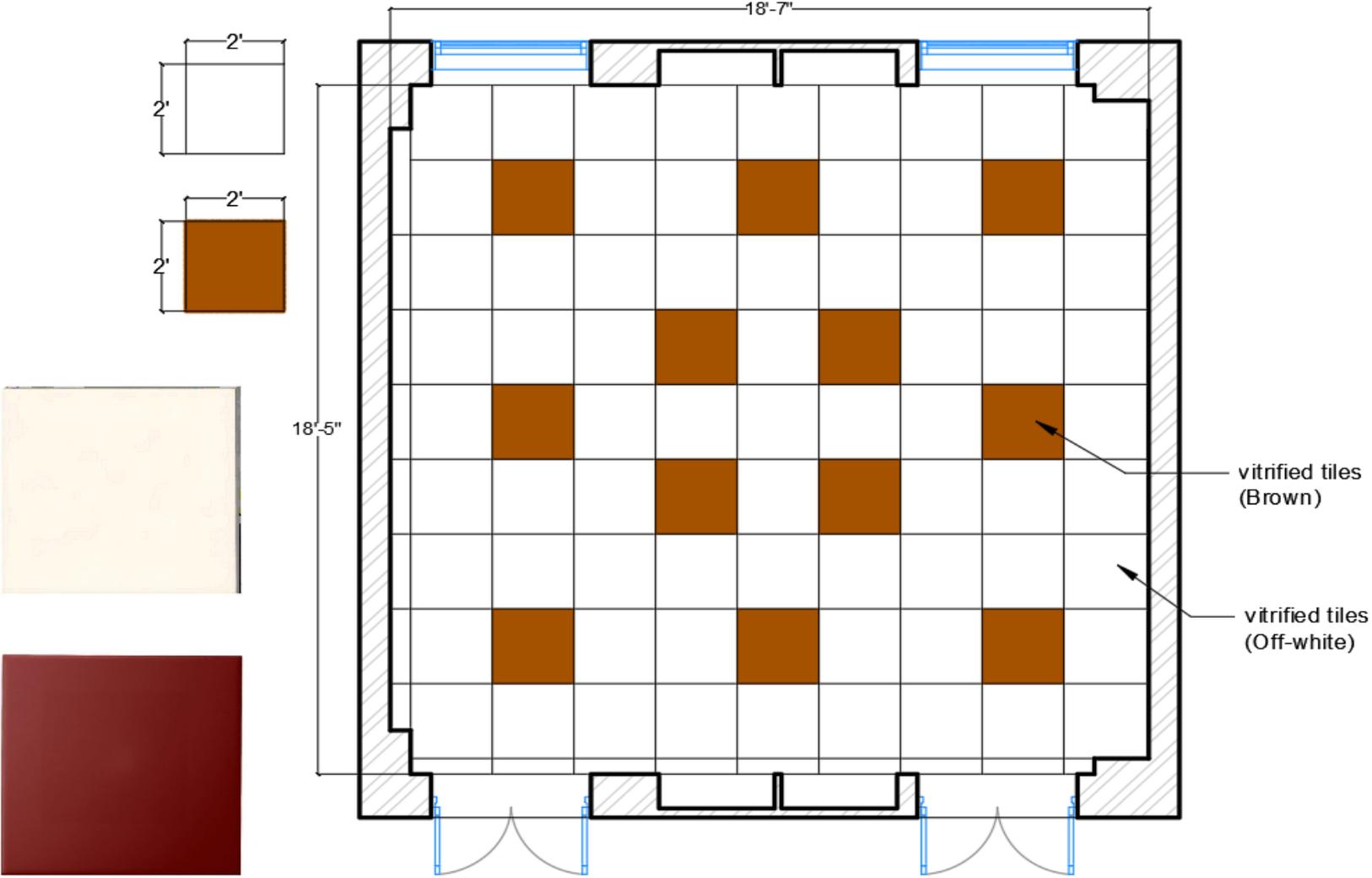**Plate 17: Investigator conducting interviews with school teachers**

Plate 18: Investigator conducting the various interior design aspects of a classroom

Existing classroom:

Figure 5: Existing layout of the classroom of School 1

Existing floor plan:

Figure 6: Existing floor plan of the classroom of School 1

Existing electrical layout:

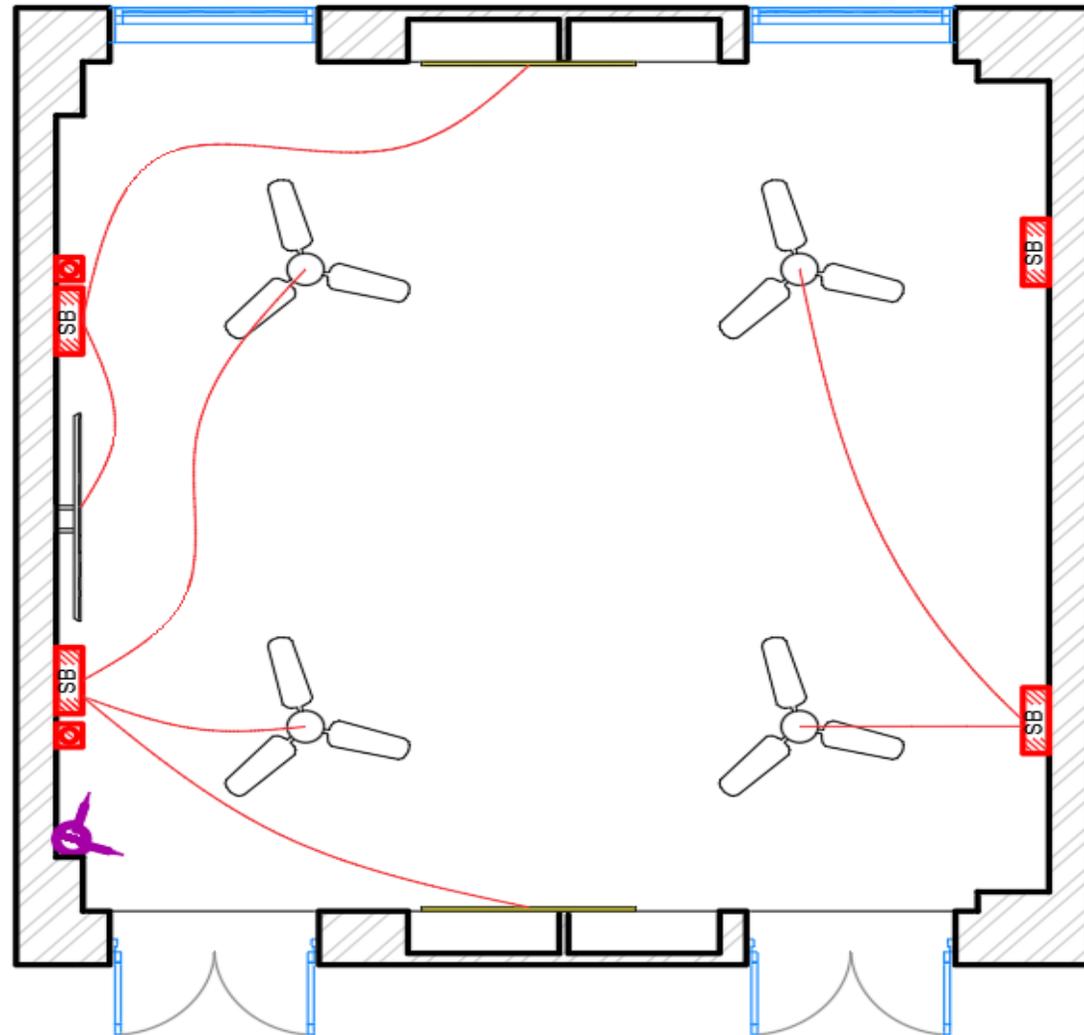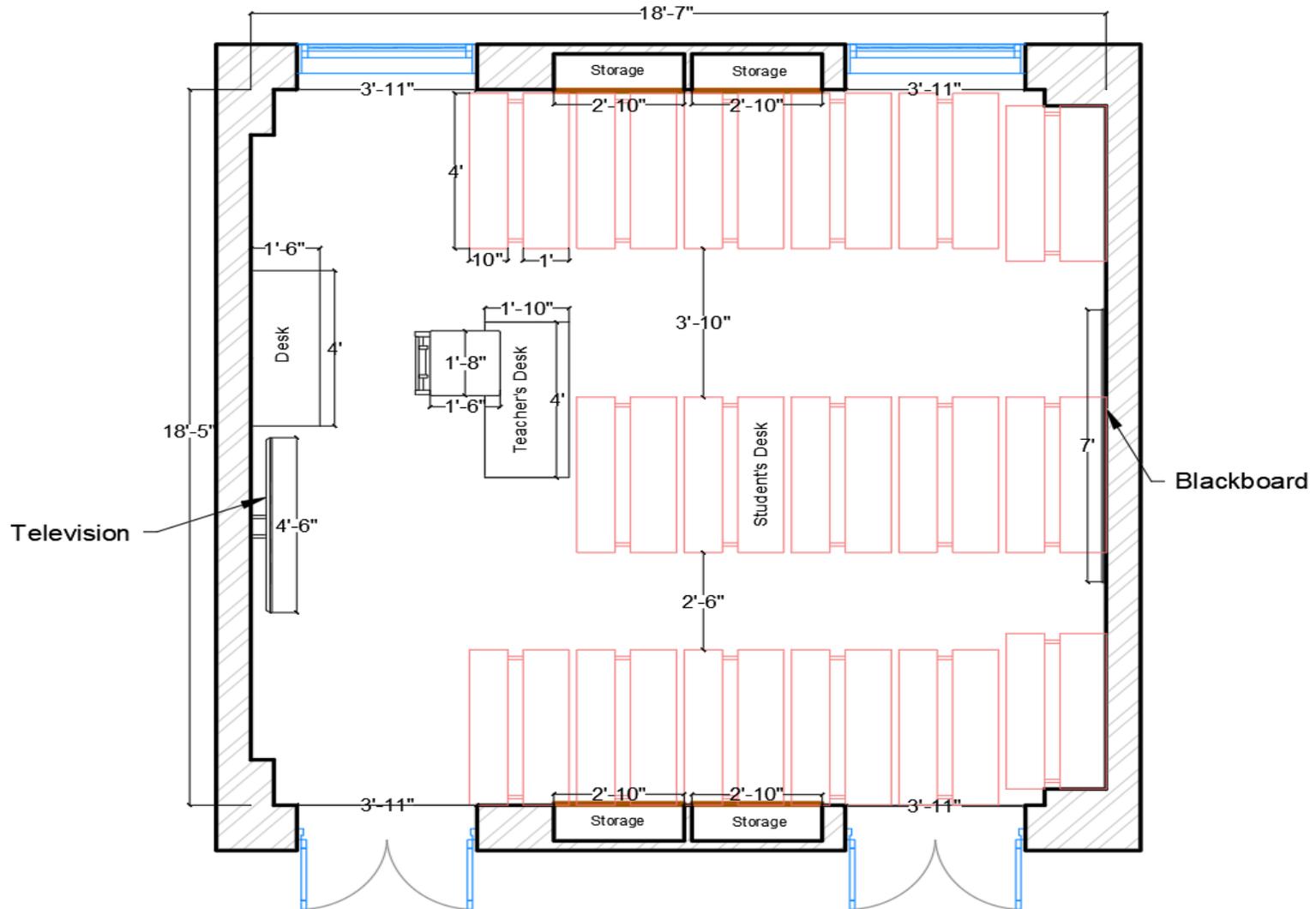| Symbol	Name	Quantity
SB	Switch board	4
◎	LAN cable	2
(CCTV symbol)	CCTV camera	1
—	Fluorescent tube light	2
(Fan symbol)	Fan	4
—	Television	1

Figure 7: Existing electrical layout of the classroom of School 1

Existing furniture layout:

Figure 8: Existing furniture layout of the classroom of School 1

Phase II: Design Development of the selected Vadodara municipal school in Vadodara city.

Design development of the present study mainly focuses on the interior design features of selected Vadodara municipal schools. The design development included interior component such as surface treatments of flooring, walls, and ceilings, along with furniture, furnishings, decorative elements, lighting, ventilation, and electrical and telecommunication systems.

Proposed floor plan:
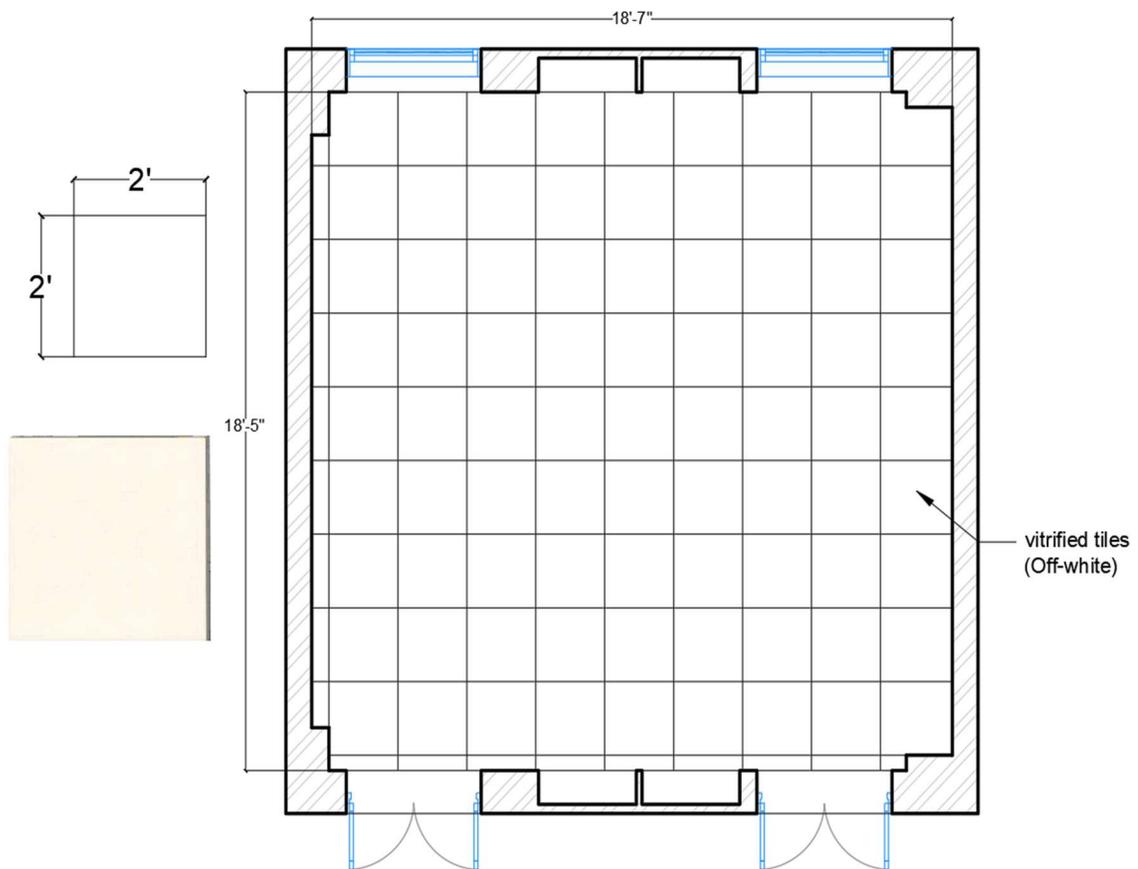
Figure 9: Proposed floor plan of the classroom

Floor: The classroom floor features 2'-0" x 2'-0" off-white vitrified tiles with a smooth, shiny finish, enhancing brightness and aesthetics. A 4" high matching vitrified tile skirting runs along the walls, protecting them from scuffs and ensuring a clean, cohesive look. This design is both durable and easy to maintain, promoting a neat classroom environment.

Proposed electrical layout:

Symbol	Name	Quantity
SB	Switch board	7
⊙	LAN cable	1
HDMI	HDMI cable	1
—	LED light	6
⟟	Fan	4
Projector	Projector	1
CCTV	CCTV camera	2
▯	Speaker	2
⬚	Computer	1
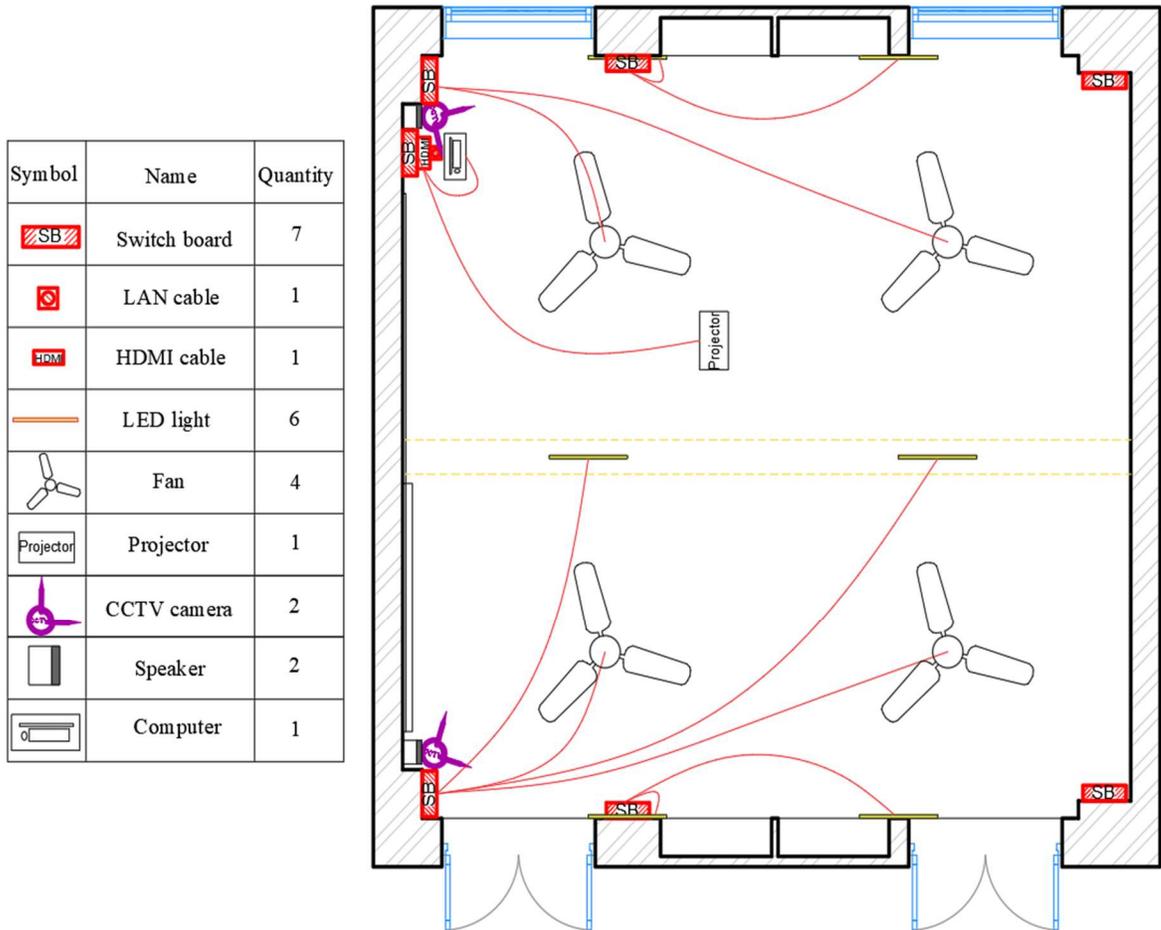
Figure 10: Proposed electrical layout of the classroom

The proposed ceiling layout features four ceiling fans, each measuring 4'6", evenly distributed to ensure proper air circulation. Six LED tube lights, each 2' long, are arranged to provide uniform illumination throughout the room. Electrical fixtures include seven strategically placed switchboards, one HDMI cable, and one LAN cable for digital connectivity. A centrally positioned projector supports visual learning, complemented by two speakers located at opposite corners. Two CCTV cameras are installed for security, and a computer is integrated into the setup, making the classroom well-suited for both traditional and digital teaching methods.

Proposed false ceiling layout:

Gypsum Armstrong False Ceiling
2' x 2'
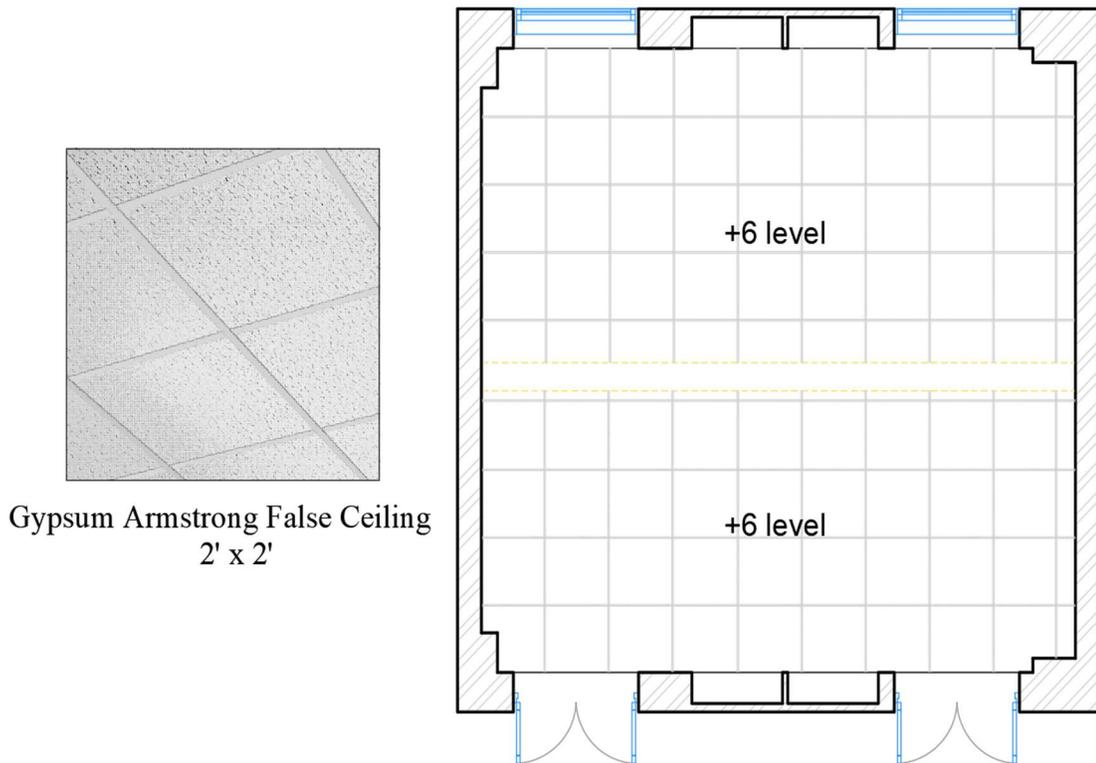
Figure 11: Proposed false ceiling layout of the classroom

False ceiling: The proposed false ceiling layout features a Gypsum Armstrong ceiling with 2' x 2' tiles, arranged in a grid pattern. The ceiling is set at a +6 level, ensuring a clean and modern look while concealing electrical wiring, lighting fixtures. This design enhances acoustics and thermal insulation, creating a comfortable learning environment. The modular tiles allow easy access for maintenance, ensuring practicality and durability in the classroom setting.

Proposed Walls:
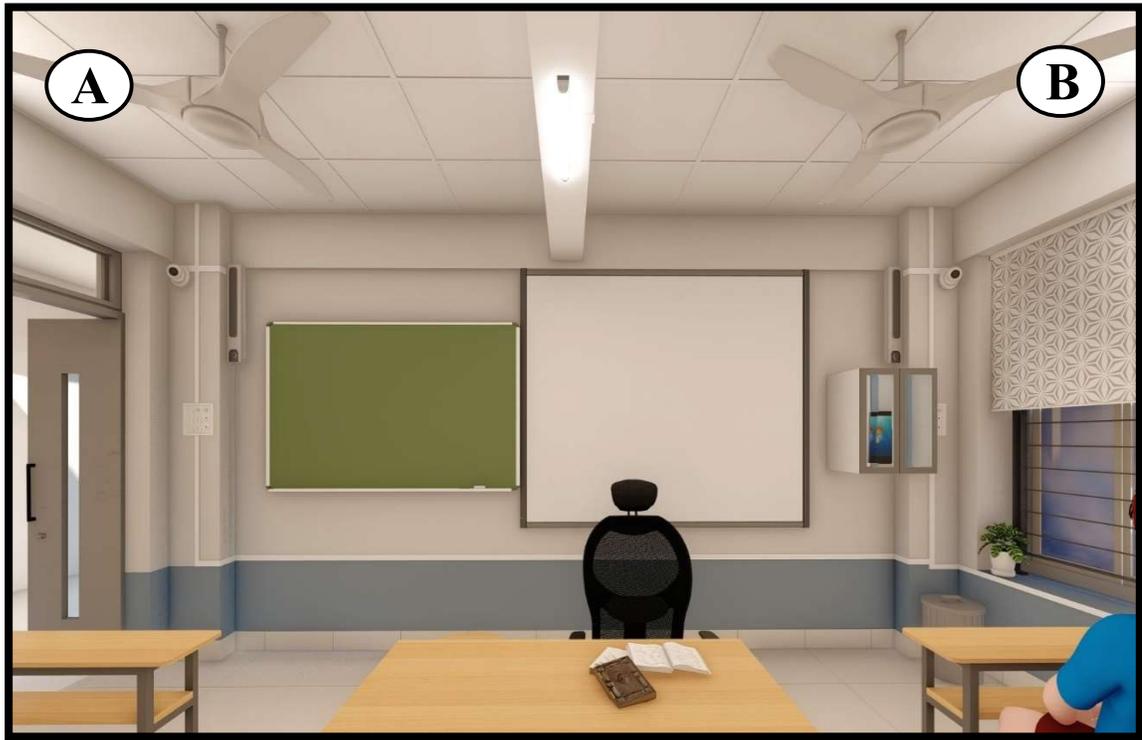
Plate 19: Proposed wall elevation A B of the classroom

The classroom's front wall AB, measuring 18'5" wide and 9'6" height, features light gray and Buckland Blue emulsion paint, creating a modern and focused atmosphere. The upper section is light gray for reduced glare, while the lower Buckland Blue section adds contrast, separated by a clean horizontal line. Both sections have a smooth, matte emulsion finish, known for durability and easy maintenance.

Functional elements include a blackboard on the left, a retractable projector screen in the right, and a wall-mounted computer cabinet on the right. Vertical speakers flank the wall for audio coverage, with CCTV cameras at the upper corners for security. A switch board near the door controls electrical equipment, and a dustbin by the window promotes cleanliness. This design balances aesthetics and functionality, enhancing the learning environment.
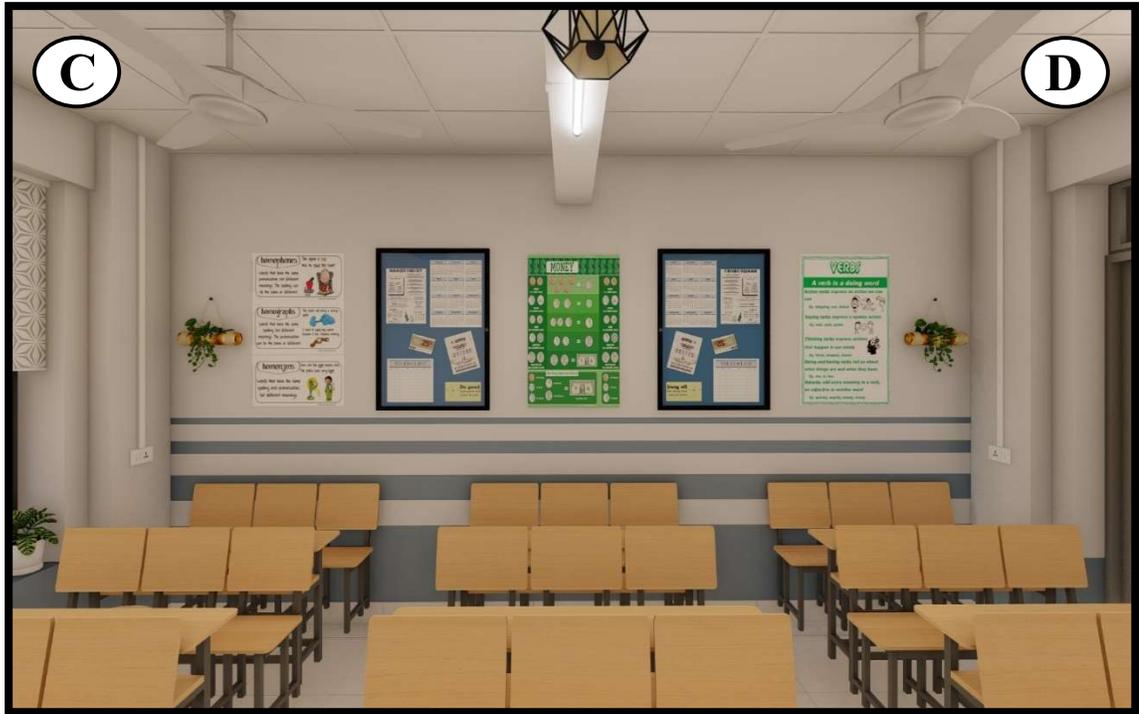
Plate 20: Proposed wall elevation B C of the classroom

The classroom wall BC, measuring 18'7" wide and 9'6" height, features a modern color scheme using light gray and Buckland Blue emulsion paint. The upper section is painted in light gray, creating a clean, neutral backdrop, while the lower section in Buckland Blue adds a calming contrast. A precise horizontal division line separates these two colors.

The BC wall is smoothly plastered, primed, and coated with two layers of high-quality emulsion paint, providing a matte finish that minimizes glare and offers easy maintenance. The finish is both durable and aesthetically pleasing, suitable for a classroom environment.

Several functional and decorative elements enhance this BC wall. Two large windows with patterned roller blinds allow natural light while maintaining privacy. Beneath the windows, potted plants add a touch of greenery, promoting a refreshing ambiance. A centrally positioned storage unit with a combination of open shelves and wooden cabinets provides organized storage for classroom materials. The shelves display decorative sculptures and geometric objects, adding an artistic touch. A classic round wall clock is mounted to the left of the storage unit, ensuring students can easily keep track of time. Overhead, two tube lights are symmetrically placed to ensure even illumination.

Plate 21: Proposed wall elevation C D of the classroom

The C D wall, measuring 18'5" wide and 9'6" height, is finished with a combination of light gray and Buckland Blue emulsion paint, creating a modern and engaging environment. The upper portion is painted in light gray, providing a neutral backdrop that highlights displayed educational materials. The lower portion is painted in Buckland Blue, adding depth and character, separated from the upper section by two thin horizontal stripes in a slightly darker gray tone for added visual interest.

The CD wall is smooth and primed before applying two coats of high-quality emulsion paint, ensuring durability and an even matte finish that minimizes glare. This finish is easy to clean, making it practical for classroom use.

Several elements are integrated into the design. In the upper section, two bulletin boards are mounted, framed in black for a clean and professional look. These boards are used to display educational posters, announcements, and student work, encouraging engagement and learning. Additionally, three educational posters are placed to provide quick reference information and visual interest. Two hanging plant holders with small green plants are symmetrically placed on either side, adding a touch of nature and enhancing the aesthetic appeal.

Plate 22: Proposed wall elevation D A of the classroom

The classroom's D A wall, measuring 18'7" wide and 9'6" height, is finished with high-quality emulsion paint, blending light gray and Buckland Blue for a modern yet welcoming atmosphere. The upper section is painted in light gray, promoting brightness and openness, while the lower section, in Buckland Blue, creates a visual anchor.

The D A wall is smoothly plastered, primed, and painted with two coats of emulsion paint, providing a durable, matte finish that minimizes glare. This finish ensures easy maintenance.

This D A wall incorporates both functional and decorative elements. A large storage cabinet with wood-textured panels and a black metal frame is centrally placed, offering organized storage for teaching materials and supplies. Above the cabinet, open display shelves showcase educational sculptures and artifacts. On each side of the cabinet, double doors with vertical glass panels provide access to adjoining rooms, promoting visibility and openness while maintaining privacy. Mounted on both sides are wall planters with cascading greenery, adding a touch of nature to the environment. A calendar is affixed near one of the doors, serving as a practical reference for daily scheduling

Proposed furniture layout:
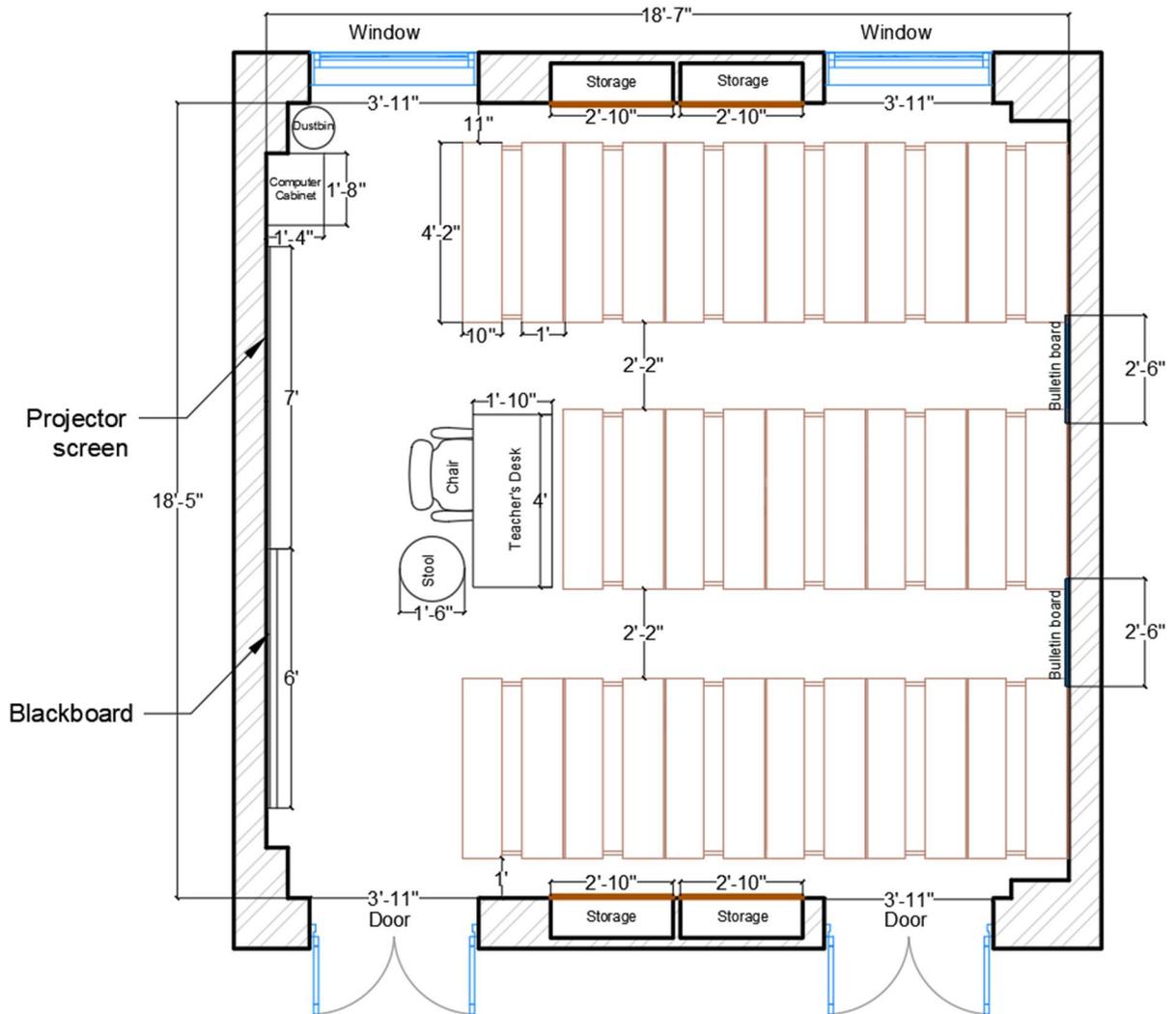
Figure 12: Proposed furniture layout of the classroom

Classroom Furniture and Furnishings:

The furniture layout plan illustrates a well-organized municipal school classroom with strategic placement of furniture and interior design elements to enhance the learning environment. The classroom measures 18'-7" in width and 18'-5" in length, providing sufficient space to accommodate students and teaching equipment. Two doors 3'-11" are positioned at the bottom of the layout to allow smooth entry and exit.

The seating arrangement consists of three rows of desks and benches, with a 2'-2" gap between rows for easy movement and interaction. The teacher's desk, chair, and stool are

placed at the front, with a 1'-10" distance from the first row, allowing the teacher to effectively engage with students. The blackboard 6' wide is fixed on the left wall, accompanied by a 7' wide projector screen, supporting both traditional and digital teaching methods.

To ensure proper storage and organization, the layout includes two storage units 2'-10" each on the top wall and two additional storage units 2'-10" at the bottom. A computer cabinet 1'-8" is positioned near the front corner for technological support, while a dustbin is placed next to it for waste management.

The classroom is well-ventilated with two windows 3'-11" on the top wall with curtain, allowing natural light and fresh air circulation. Additionally, bulletin boards 2'-6" on both side walls provide space for displaying educational materials and announcements. The layout design also ensures that students and teachers can move comfortably within the space, creating an effective and efficient learning environment.

Phase III: Cost Estimation of the proposed Design Project.

In the successful planning and execution of any interior design research, accurate cost estimation is a critical component. It ensures that the financial aspects align with the proposed design outcomes. For this study, cost estimates were developed based on the actual prices of materials required for the proposed redesign of selected VMC school classrooms. The estimates considered various design components such as surface treatments, furniture, lighting, and digital infrastructure.

A medium-budget solution was proposed to ensure a balance between quality, durability, and cost-effectiveness. This budget framework aligns with government tender approvals, making the project feasible for implementation within municipal schools. By focusing on a single cost option, the design maintains both practicality and sustainability while meeting financial and regulatory requirements.

The total estimated cost for the classroom interior design is ₹2,52,250, as detailed below:

Table 31: Total cost estimation of the all-Interior design of the classroom

Sr. No.	Interior Design Aspects	Total cost in ₹
1.	Floor, Wall and Ceiling	24,850 ₹
2.	Furniture items	1,40,600₹
3.	Electrical devices	59,600 ₹
4.	Accessories	2200 ₹
5.	Designing charge	25,000 ₹
	Grand total	2,52,250 ₹

Note: The Cost Estimation is based on the market price as in the month of February, 2025.

Table 32: Cost Estimation for Flooring, Ceiling and Wall Treatment for the Selected Classroom

Interior Design Aspects	Total area	Material	Colour	Quantity required	Material Cost Per piece in ₹	Labour cost in ₹	Total cost in ₹
Flooring	316.45 sq ft	Vitrified tiles	Off-white	102 piece	35 ₹	4500 ₹	8070 ₹
Ceiling	316.45 sq ft	Gypsum Armstrong	White	90 piece	60 ₹	3500 ₹	8900 ₹
Wall	969.35 sq ft	Emulsion Paint	Light grey	10.86 liters	270 ₹	2500 ₹	5430 ₹
			Buckland blue	4.65 liters	270 ₹	1200 ₹	2450 ₹
						Total	24,850 ₹

Table 33: Cost Estimation for Proposed Furniture and furnishings of the Selected Classroom

| Furniture item	No. of furniture piece	L x b x h	Material	Colour	Cost per unit ₹	Labour cost in ₹	Total cost in ₹
Teacher's desk	1	4' x 1'10" x 2'8"	Pine Wood	Wooden	10,000 ₹	2000 ₹	12,000₹
Teacher's chair	1	2'4" x 2' x 4'	Metal, Mesh, Foam, Nylon	Black	8000 ₹	-	8000₹
Stool	1	1'4" x 1'4" x 2'	Pine Wood	Wooden	1500 ₹	600 ₹	2100₹
Computer cabinet	1	1'8" x 1'2" x 2'	Pine Wood	White	3500 ₹	800 ₹	4300₹

Student's bench	17	4'2" x 2'6" x 2'10"	Pine Wood, metal	Wooden	2500 ₹	600 ₹	52,700₹
Storage unit	4	2'10" x 1' x 7'8"	Pine Wood, Metal, Glass	Wooden	8000 ₹	1800 ₹	39,200₹
Black board	1	6' x 1.5" x 3'6"	Porcelain Enamel, Porcelain coated steel	-	4000 ₹	-	4000 ₹
Bulletin board	2	2'6" x 1.5" x 3'2"	Fabric, Porcelain coated steel, Glass	Blue	1200 ₹	-	1200 ₹
Door	2	3'11" x 2" x 7'	Pine Wood and glass	Grey	5500 ₹	800 ₹	12,600₹
Window	2	3'11" x 2" x 5'	Pine Wood and glass	Grey	4000 ₹	600 ₹	9200₹
Roller Shades	2	3'11" x – x 6'2"	Polyester	Black and white	1100 ₹	-	1100₹
Ventilation	4	3'11" x 2" x 1'2"	Pine Wood and glass	Grey	1400 ₹	300 ₹	6800₹
						Total	**1,40,600₹**

Table 34: Cost estimation of electrical devices and fixtures for the selected Classroom

Electrical devices/ Fixtures	No. of items	Cost per piece in ₹	Total piece Cost ₹	Fixture cost in ₹	Total cost in ₹
LED light	6	250 ₹	1500 ₹	300 ₹	1800 ₹
Fan	4	1500 ₹	6000 ₹	800 ₹	6800 ₹
Projector	1	31,000 ₹	31,000 ₹	1500 ₹	32,500 ₹
CCTV camera	2	950 ₹	1900 ₹	600 ₹	2500 ₹
Speaker	2	1500 ₹	3000 ₹	500 ₹	3500 ₹
Computer	1	12,000 ₹	12,000 ₹	500 ₹	12,500 ₹
				Total	59,600 ₹

Table 35: Cost Estimation of Accessories for the Selected Classroom

Accessories	No. of items	Cost per piece in ₹	Total cost in ₹
Plant	4	150 ₹	600 ₹
Hanging Plant	2	250 ₹	500 ₹
Hanging Light	1	800 ₹	800 ₹
Wall Clock	1	300 ₹	300 ₹
		Total	2,200 ₹
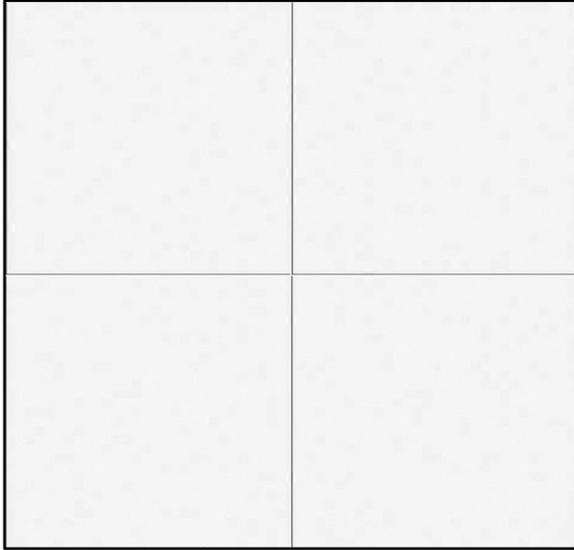
Plate 23: Vitrified tiles, Off-white

Plate 24: Gypsum Armstrong, White

Plate 25: Emulsion Paint, Light grey

Plate 26: Emulsion Paint, Buckland blue
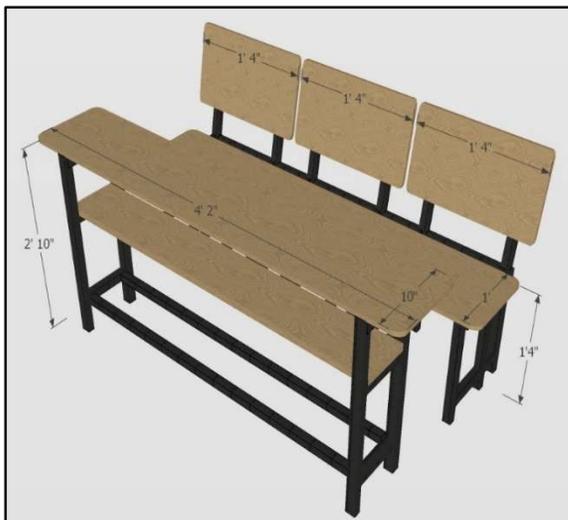
Plate 27: Students bench
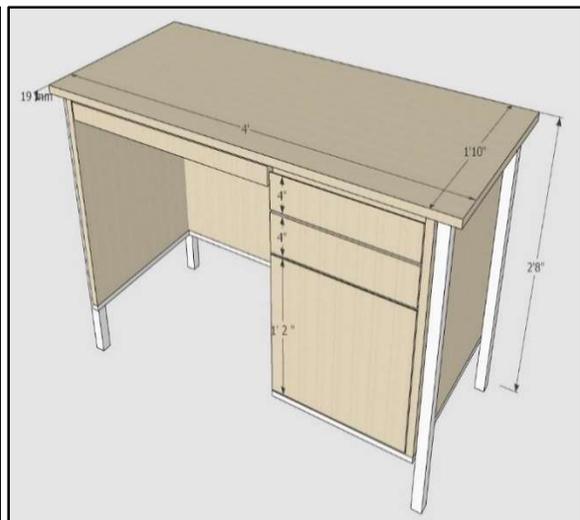
Plate 28: Teachers' desk

Plate 29: Teachers' chair

Plate 30: Stool

Plate 31: Computer cabinet
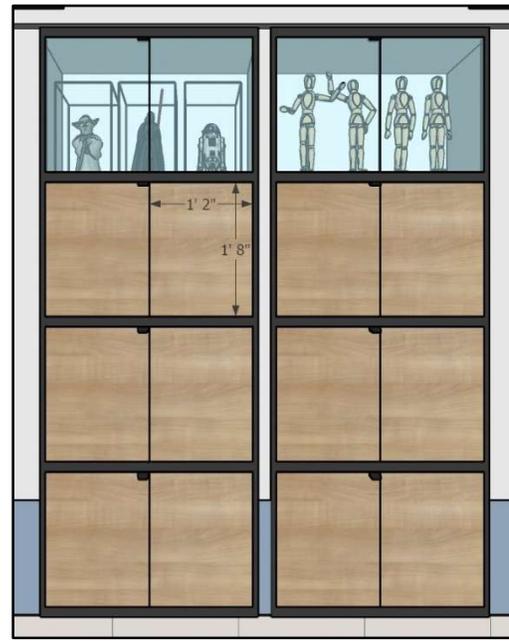
Plate 32: Storage unit

Plate 33: Black board

Plate 34: Bulletin board

Plate 35: Door
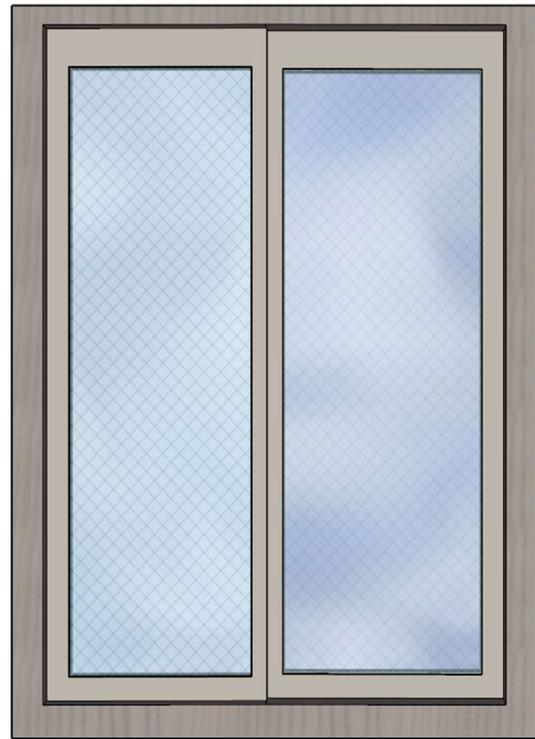
Plate 36: Window
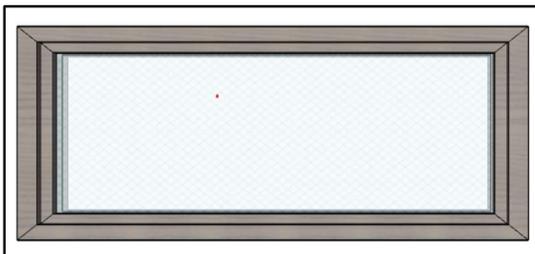
Plate 37: Ventilation
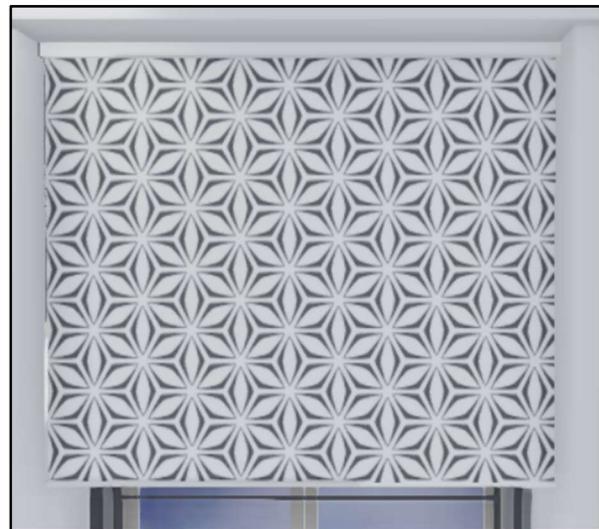
Plate 38: Roller Shades

Plate 39: LED light
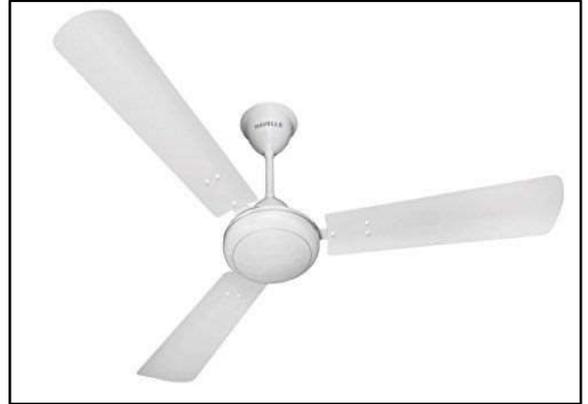
Plate 40: Fan

Plate 41: Projector

Plate 42: CCTV camera

Plate 43: Speaker

Plate 44: Computer

Plate 45: Plant

Plate 46: Hanging light
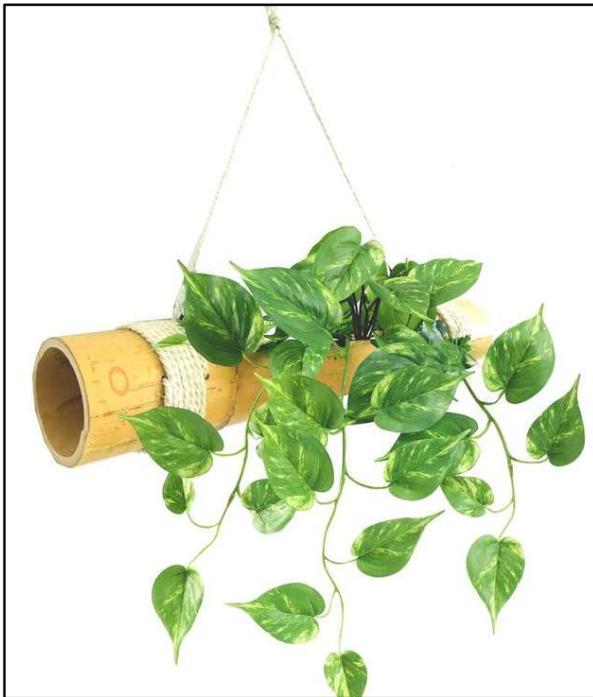
Plate 47: Hanging plant
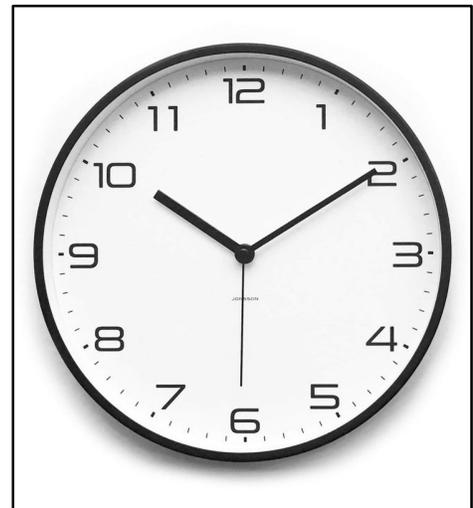
Plate 48: Wall clock

SUMMARY, CONCLUSION & RECOMMENDATIONS

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

The design of learning spaces plays a crucial role in shaping students' educational experiences by fostering engagement, collaboration, and creativity. Beyond being mere physical spaces, classrooms should be inclusive, adaptable, and supportive of diverse learning needs. Effective classroom design incorporates ergonomic furniture, optimal lighting, proper ventilation, and technology integration to enhance student motivation, cognitive development, and participation. However, municipal schools, particularly in resource-constrained areas, face significant challenges such as overcrowding, inadequate lighting, poor ventilation, and outdated furniture, which negatively impact student engagement and teacher effectiveness. Addressing these deficiencies through improved spatial planning, ergonomic designs, and visually stimulating elements can greatly enhance learning environments. Key design elements including furniture layout, color schemes, acoustic treatment, and natural lighting affect students' comfort, concentration, and well-being. Thoughtful placement of doors and windows optimizes air circulation and noise control, while integrating technology ensures modern, interactive learning experiences. By assessing current municipal classroom conditions and proposing design improvements, this study aims to provide practical recommendations that enhance functionality, aesthetics, and overall learning effectiveness. Prioritizing interior design in classrooms creates dynamic, inclusive, and engaging environments, ultimately improving academic outcomes and supporting students' holistic development.

During the review of the literature, it was found that research conducted outside India primarily focused on various aspects of classroom interior design, including its impact on student engagement, learning outcomes, mental health, creativity, and inclusivity. Studies explored elements such as seating arrangements, lighting conditions, color schemes, environmental factors, and specialized designs for students with special needs. However, the related research carried out in India focused largely on general aspects of school infrastructure, traditional classroom settings, and broad educational facilities, with limited emphasis on the specific role of interior design in enhancing learning experiences. There was a noticeable gap in research on the influence of classroom interior design on student

engagement, well-being, and academic performance within the Indian context. As the researcher did not find any similar study in this area, the present research focuses on assessing interior design aspects of a classroom and proposing suitable design for selected municipal schools of Vadodara city.

The Department of Family and Community Resource Management, Faculty of Family and Community Sciences, Maharaja Sayajirao University of Baroda, offers courses such as "Interior Design & Furnishings," "Commercial Space Design," and "Services & Cost Estimation in Interior Design" at both undergraduate and postgraduate levels. The focus of this study is to analyze and enhance classroom interior design in municipal schools, ensuring that learning spaces are both functional and conducive to academic success. The findings of this research will benefit students, educators, school administrators, and policymakers by providing insights into the role of interior design in creating an effective educational environment.

The results of this study will also be valuable for architects, interior designers, urban planners, and other stakeholders involved in school infrastructure development. By identifying the key elements that influence student engagement and learning outcomes, this research will serve as a foundation for future studies in the field of educational space planning. The study aims to highlight innovative and cost-effective design solutions that optimize classroom interiors, ensuring a better learning experience for students in Vadodara's municipal schools. Ultimately, this research seeks to promote a more student-centric approach to classroom design, emphasizing the importance of ergonomics, lighting, acoustics, and spatial organization. These findings can also serve as a model for improving learning spaces in other cities and districts across Gujarat, contributing to the broader discourse on the role of interior design in education.

Statement of the problem

The present study aims to assess interior design aspects of a classroom and proposing suitable design for selected municipal schools of Vadodara city.

Objective of the study

1. To assess the interior design aspects of classroom in selected Municipal Schools of Vadodara city.

2. To identify extent of problems faced by school teachers with regards to aspects of interior design in classroom of selected Municipal Schools of Vadodara city.

3. To assess the opinion of school teachers regarding existing interior design aspects in the classroom of selected Municipal Schools of Vadodara city.

4. To propose suitable design of the classroom taking into consideration all interior design aspects.

Delimitation of the study

1. This study is limited to selected Municipal Schools of Vadodara city.

2. The study will be limited to Gujarati medium Primary Municipal Schools of Vadodara city.

3. The study will be limited to 5 primary classrooms from 5 different Municipal Schools of Vadodara city.

4. The study will be limited to those teachers who are working in the school for more than 5 years.

Methodology

A descriptive research design was adopted for the present study. The research was conducted in Vadodara City, Gujarat, India, focusing on the redesign of classroom spaces in municipal schools. The unit of inquiry included school teachers from selected municipal schools. A purposive sampling technique was employed for data collection. Prior consent was obtained from the respondents, and they were requested to provide necessary information for the study.

The study employed a structured approach to data collection using an observation sheet, interview schedule, and questionnaire to assess the existing design of classrooms in selected municipal schools of Vadodara city. The tools were selected based on a literature review, expert guidance, and personal observation. An interview schedule was developed to identify the extent of problems experienced by teachers, while a questionnaire was

designed to assess their opinions regarding classroom design. Additionally, an observation sheet was used to systematically document various interior aspects of the classrooms. The observation sheet focused on interior elements such as walls, floors, ceilings, furniture, lighting, ventilation, electrical and telecommunication services, accessibility, and overall comfort. The interview schedule was divided into two sections: background information of the respondents and the problems faced by teachers regarding classroom design. A 3-point summated rating scale was used to assess the extent of problems faced by school teachers regarding classroom design. The scale included three response options: major problem, minor problem, and no problem. A higher score indicated a high extent of problem, and vice versa. The questionnaire, structured as an opinion scale, captured teachers' perspectives on classroom design using a 3-point Likert scale Agree, Neutral, Disagree, where higher scores indicated a favorable opinion and lower scores suggested unfavorable opinion.

The content validity of the research tools was established by seeking expert opinions from a panel of 11 judges from the Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara. Additionally, input was obtained from practicing interior designers and architects to ensure the relevance and clarity of the statements. Necessary modifications were incorporated based on expert suggestions.

The study established the reliability of selected scales using Cronbach's alpha, with a reliability value of 0.89 for the opinion scale. Data collection was conducted between October and November 2024 through interviews and observation sheets, ensuring accurate and honest responses from municipal school teachers in Vadodara.

The study also involved the redesign of a classroom in one municipal school based on expert recommendations. Three design options were proposed, utilizing AutoCAD 2024, SketchUp 2023, and Lumion 8.5 for visual representations, including floor plans, wall elevations, electrical layouts, and 3D views. Cost estimation was conducted to ensure affordability and feasibility within municipal school budgets, balancing quality, durability, and cost-effectiveness in alignment with government regulations.

Major Findings

The major findings of the study were as follows:

Section I Demographic profile of the respondents: The demographic profile of 80 respondents revealed that the majority, 56.25 percent, were aged 36 to 45 years, followed by 33.75 percent in the 46 to 55 age group and 10 percent in the 26 to 35 range, indicating a predominantly experienced workforce. Female respondents, 68.75 percent, outnumbered males, 31.25 percent. Regarding education, 40 percent were graduates, 31.25 percent were post-graduates, 18.75 percent held a PTC qualification, and 10 percent had a Ph.D. Most respondents, 68.75 percent, worked 5 to 6 hours daily, while 31.25 percent worked 7 to 8 hours. Work experience varied, with 41.25 percent having 2 to 12 years, 27.5 percent having 13 to 22 years, and 31.25 percent having 23 to 33 years, highlighting a well-experienced teaching community.

Section II The extent of problems experienced by teachers regarding existing design of classroom in selected municipal schools in Vadodara city: The study evaluated the problems teachers faced with classroom design in selected municipal schools of Vadodara city. Various interior aspects, including surface treatments on wall, floor and ceiling, furniture, accessories, lighting, ventilation, and electrical services, were assessed, focusing on placement, size, material, ease of use, safety, maintenance, aesthetics, and overall comfort.

Among the findings of surface treatments, 52.5 percent of respondents reported significant problems with classroom walls due to poor maintenance, cracks, and peeling paint, indicating the need for better materials and upkeep. Flooring problems were noted by 42.5 percent of respondents, particularly regarding movement and comfort, emphasizing the necessity of durable, non-slippery surfaces. The ceiling posed the highest concern, with 56.25 percent of respondents experiencing discomfort due to poor ventilation and temperature control, highlighting the need for improved materials and aesthetics.

Furniture also presented major concerns. The placement of the teacher's desk was problematic for 51.25 percent of respondents, affecting movement, visibility, and accessibility. Additionally, 51.25 percent of teachers found the aesthetics of their chairs unappealing, while 44 percent faced comfort problems. The student's desk/bench was

another key concern, with 52.5 percent of respondents reporting discomfort and 48.75 percent identifying unsuitable dimensions. Storage units were also a significant problem, with 55 percent of respondents facing problems with poor placement and arrangement. The blackboard's placement and arrangement were the most problematic, with 56.25 percent of respondents highlighting problem that affected visibility and accessibility. Similarly, 52.5 percent of respondents reported problems with the placement of bulletin boards. Regarding classroom entry and airflow, 47.5 percent of respondents reported problems with the material/finish and overall comfort of doors, while 53.75 percent had concerns about the placement of windows, which affected natural light and ventilation. Furthermore, 47.5 percent of respondents faced problems with ventilation placement, impacting airflow and overall classroom comfort.

Accessories and decorative elements were another area of concern. The wall clock's placement and arrangement were problematic for 55percent of respondents, making visibility a problem. Similarly, 47.5 percent of respondents faced problems with the placement of the calendar, which hindered accessibility.

Lighting and fan problems were widely reported. Improper placement and arrangement of tube lights led to poor illumination, as reported by 56.25 percent of respondents. Additionally, 60 percent of respondents highlighted problems due to an insufficient number of fans, resulting in poor air circulation and discomfort.

Digital infrastructure also required significant improvements. Among digital devices, 40percent of respondents reported problems with the placement and arrangement of projectors, affecting visibility and effectiveness. Similarly, 40 percent of respondents reported placement problems with projector screens, which impacted clear visibility. The television's placement was problematic for 27.5 percent of respondents, while 41.25 percent reported problems with the overall comfort of speakers, indicating an inadequate auditory experience. Additionally, 37.5 percent of respondents faced problems with the placement of CCTV cameras, which affected monitoring and coverage.

Electrical fixtures also posed accessibility and usability challenges. The placement and arrangement of switch boards were a problem for 48.75 percent of respondents, affecting accessibility and convenience. Likewise, 48.75 percent of respondents reported problems with the placement of HDMI ports, impacting ease of use. Lastly, 36.25 percent   of

respondents faced problems with the placement of LAN connections, highlighting the need for efficient connectivity.

Overall, the weighted mean scores indicated that the most problematic aspects of the existing classroom design were the teacher's desk 2.22, ceiling 2.14, and student desks/benches 2.09, which significantly impacted both teaching and learning experiences. These findings emphasize the need for improvements in classroom infrastructure, including better-quality materials, enhanced furniture design, optimized layouts, and upgraded digital and electrical facilities. Addressing these problems would contribute to creating a more functional, comfortable, and conducive learning environment for both teachers and students.

Section III Opinion of teachers regarding existing design of classroom in selected municipal schools in Vadodara city: The study assessed teachers' opinions on the existing classroom design in selected municipal schools in Vadodara city using a 15-statement survey on a 3-point Likert scale. The findings revealed that natural lighting and ventilation were the most positively rated aspects, with 46.25 percent of teachers agreeing that classrooms received sufficient natural light, improving visibility and the learning environment. Additionally, 27.5 percent of teachers believed that air circulation was adequate, contributing to a comfortable atmosphere.

The weighted mean scores highlighted that access to natural light received the highest rating, followed by good air circulation, underscoring their importance in creating a favorable classroom setting. Based on the responses, 45 percent of teachers had a highly favorable opinion of the existing classroom design, while 33.75 percent held a moderately favorable view. However, 21.25 percent of teachers expressed an unfavorable opinion, indicating areas that require improvement.

Section IV: Design Development of the selected municipal school in Vadodara city:

Phase I Details of interior design aspects of a classroom in selected municipal schools of Vadodara city as recorded in observation sheet: The study assessed the interior of classroom in selected five municipal primary schools in Vadodara, focusing on classroom design and interior features. Selected schools were as old ranging from 112 years to 126

years, served diverse city areas and operated for 10 to 11 hours daily. Classroom sizes and orientations vary, with most being rectangular and flooring consisting of ceramic tiles.

Interior conditions reveal concerns such as cracked walls, peeling paint, dampness, and exposed electrical wiring in some schools. Ceiling fans and tube lights require maintenance, while furniture especially teacher desks and student benches vary in quality, with some lacking storage or showing wear. Storage units face problem like rust surface, poor accessibility, and damaged doors. Blackboards and bulletin boards also need improvements.

Lighting and ventilation were generally good, though some classrooms rely more on artificial lighting due to small windows. Digital tools like televisions and projectors were available but often poorly placed, reducing effectiveness. Furniture placement in some schools obstructs movement and emergency exits, affecting accessibility. Overall, while these schools provide basic infrastructure, maintenance and layout improvements are needed to enhance safety, comfort, and the learning environment.

Phase II: Design Development of the selected municipal school in Vadodara city: The design development phase of the study focuses on enhancing the interior design features of selected VMC schools, including flooring, walls, ceilings, furniture, lighting, ventilation, and electrical systems. The proposed classroom improvements aim to create a modern, functional, and aesthetically pleasing learning environment.

The flooring will consist of off-white vitrified tiles with a smooth, shiny finish for durability and easy maintenance. The proposed electrical layout includes evenly distributed ceiling fans, LED tube lights, strategically placed switchboards, and digital connectivity features like an HDMI and LAN cable. A centrally positioned projector, speakers, CCTV cameras, and a computer setup will support both traditional and digital learning. The false ceiling will be made of Gypsum Armstrong tiles, enhancing acoustics, insulation, and maintenance accessibility.

Wall designs incorporate a combination of light gray and Buckland Blue emulsion paint for a modern and visually balanced effect. Functional elements include blackboards, retractable projector screens, wall-mounted storage cabinets, and decorative elements like

potted plants and sculptures. Bulletin boards, educational posters, and wall-mounted planters will further enrich the learning space.

The furniture layout is carefully planned for efficiency and accessibility. Desks and benches are arranged in rows with sufficient space for movement, while the teacher's desk, blackboard, and projector screen are positioned for effective instruction. Storage units and a computer cabinet provide organized space for materials. Well-placed windows ensure natural ventilation, and bulletin boards on both side walls support educational displays. These enhancements aim to create a comfortable, functional, and engaging classroom environment.

Phase III: Cost Estimation of the Proposed Classroom Design: Accurate cost estimation is essential for the successful execution of the classroom interior design project. This study developed cost estimates based on actual market prices, covering flooring, ceiling, walls, furniture, lighting, and digital infrastructure. A medium-budget solution was proposed to ensure durability, cost-effectiveness, and alignment with government tender approvals for municipal schools.

The total estimated cost for the classroom is ₹2,52,250, including ₹24,850 for flooring, ceiling, and wall treatments, ₹1,40,600 for furniture and furnishings, ₹59,600 for electrical devices and fixtures, and ₹2,200 for accessories. Additionally, a designing charge of ₹25,000 was included. This budget framework ensures a modern, functional, and sustainable learning environment for students.

Conclusion

The present research on "Assessing Interior Design Aspects of Classrooms and Proposing Suitable Design for Selected Municipal Schools of Vadodara City" was conducted in five municipal schools of Vadodara city to evaluate the existing classroom interior design and develop suitable recommendations for improvement. The major objective of the study was to assess classroom design aspects, identify the extent of problems faced by teachers, evaluate teachers' opinions on the current design, and propose a suitable classroom design considering all interior aspects.

The major findings of the study revealed that with regards to the demographic profile of respondents indicated the majority, 56.25 percent , were aged 36 to 45 years. Female respondent's 68.75 percent outnumbered male respondents' 31.25 percent . Regarding education and qualification, 40 percent were graduates, and 31.25 percent were post-graduates. Most teacher's 68.75 percent worked 5 to 6 hours daily, with 41.25 percent having 2 to 12 years of experience, indicating a well-experienced teaching community.

The findings with regards to the extent of problems faced by teachers found that, 52.5 percent of respondents reported major problem with classroom walls due to poor maintenance, cracks, and peeling paint. Flooring problem were noted by 42.5 percent , with discomfort and slippery surfaces being common concerns. The ceiling was the most problematic aspect, with 56.25 percent of teachers highlighting ventilation and temperature control problem. The placement and comfort of student desks and benches were also a concern for 52.5 percent of respondents, while 51.25 percent found the teacher's desk poorly arranged. Poorly placed windows and ventilation were problematic for 53.75 percent and 47.5 percent of respondents, respectively. Additionally, 56.25 percent reported improper lighting arrangements, and 60 percent highlighted inadequate fan placement. Digital infrastructure problem was significant, with 40 percent reporting poor projector placement, 41.25 percent experiencing speaker arrangement problems, and 37.5 percent nothing improper CCTV coverage.

The data on the opinion of teachers regarding existing classroom design indicated that natural lighting and ventilation were the most positively rated aspects, with 46.25 percent agreeing that classrooms received sufficient natural light. However, only 27.5 percent of teachers believed air circulation was adequate. Overall, 45 percent of teachers had a highly favorable opinion of the existing design, 33.75 percent had a moderately favorable view, while 21.25 percent held an unfavorable opinion.

The study further documented classroom conditions, revealing that selected schools were between 112 to 126 years old, serving diverse city areas. Classroom interiors faced problem like cracked walls, peeling paint, dampness, and exposed electrical wiring. Furniture conditions varied, with teacher desks and student benches showing signs of wear and limited storage. Digital tools like televisions and projectors were available but poorly

placed, reducing their effectiveness. While lighting and ventilation were generally good, some classrooms relied more on artificial lighting due to small windows. Furniture placement also obstructed movement and emergency exits in some schools.

To address these concerns, the study proposed a redesigned classroom incorporating modern interior design elements. The flooring was planned with off-white vitrified tiles for durability and easy maintenance. The electrical layout included evenly distributed ceiling fans, LED tube lights, switchboards, and digital connectivity with HDMI and LAN cables. The false ceiling, made of Gypsum Armstrong tiles, aimed to enhance acoustics and insulation. The wall design incorporated light gray and Buckland Blue emulsion paint for a visually balanced effect. Functional elements such as blackboards, retractable projector screens, wall-mounted storage cabinets, and decorative elements like potted plants and sculptures were integrated to create an enriched learning space. Furniture layout was planned to enhance accessibility, with well-placed desks, benches, and organized storage units. Windows were strategically positioned for natural ventilation, and bulletin boards were installed for educational displays.

Cost estimation was conducted to ensure affordability and feasibility within municipal school budgets. The total estimated cost for the redesigned classroom was ₹2,52,250, including ₹24,850 for flooring, ceiling, and wall treatments, ₹1,40,600 for furniture and furnishings, ₹59,600 for electrical devices and fixtures, and ₹2,200 for accessories. Additionally, a design charge of ₹25,000 was included, ensuring a cost-effective, durable, and modern learning environment.

Implications of the Study

The findings of the present study have several implications across various fields:

For the Field of Family and Community Resource Management

The Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, offers courses such as "Interior Design & Furnishings," "Commercial Space Design," and "Services & Cost Estimation in Interior Design" at both the Bachelor's and Master's levels. The information

gathered through this research contributes to a broader database, enhancing the curriculum by providing insights into the interior design needs of classroom of municipal schools.

For Interior Design Students

The study's findings will be particularly beneficial to students specializing in Interior Design, Architecture, and related fields. By analyzing the technical and aesthetic considerations required for designing effective and engaging classrooms, students can gain practical knowledge of spatial planning, ergonomic furniture selection, lighting, ventilation, and digital infrastructure integration. This research provides a comprehensive framework that can guide students in proposing innovative and functional classroom design solutions.

For Professionals like Architects and Interior Designers

The study serves as a feedback tool for architects and interior designers, emphasizing the necessity of well-planned educational spaces. The data highlights the need for improved classroom ergonomics, spatial efficiency, and modernized learning environments. The research can be utilized as a reference for designing not only classrooms but also other educational spaces such as libraries, laboratories, and staff rooms, ensuring they align with modern pedagogical needs and promote student engagement and teacher effectiveness.

For Policymakers and Educational Institutions

The research findings can guide educational policymakers, school administrators, and government bodies in making informed decisions about infrastructure development in municipal schools. By presenting practical, cost-effective, and sustainable design solutions, this study encourages policymakers to prioritize classroom designing through well-equipped, comfortable, and aesthetically pleasing environments in future educational policies. The recommendations can be used to implement student-centric designs that consider all interior design principles, ensuring that classrooms in Vadodara's municipal schools evolve to meet the demands of modern education.

Recommendations for Future Study

1. A similar interior design research project can be conducted for different educational spaces, such as libraries, laboratories, staff rooms, and multipurpose halls in schools to enhance the overall learning environment.

2. Future studies can explore various interior design themes for classrooms, such as nature-inspired designs, futuristic digital classrooms, flexible learning spaces, and sensory-friendly environments, to assess their impact on student engagement and learning outcomes.

3. Research can be expanded to examine the integration of indoor and outdoor learning spaces, including open-air classrooms, interactive play areas, and green spaces, to promote a holistic learning experience.

4. A comparative study can be conducted between municipal schools and private institutions to analyze the differences in infrastructure, spatial design, and learning outcomes, providing recommendations for bridging the gap in classroom design.

5. A study can also focus on the use of sustainable and cost-effective materials in classroom design, evaluating their durability, maintenance, and impact on students' well-being.

6. Future research can assess the role of technology-enhanced learning environments, such as smart classrooms, digital boards, and interactive furniture, in improving the quality of education in municipal schools.

By expanding the scope of research in these areas, future studies can contribute significantly to the improvement of educational infrastructure, ensuring that classroom designs cater to the evolving needs of students and educators.

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APPENDICES

APPENDIX I

ETHICAL COMPLIANCE CERTIFICATE

Institutional Ethics Committee for Human Research (IECHR)

**FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA**

Ethical Compliance Certificate 2024-2025

This is to certify Ms. Tisha Mistry study titled; "Assessing Interior Design Aspects of a Classroom and Proposing Suitable Design for Selected Municipal Schools of Vadodara City." from Department of Family and Community Resource Management has been approved by the Institutional Ethics Committee for Human Research (IECHR), Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda. The study has been allotted the ethical approval number IECHR/FCSc/M.Sc./10/2024/21.

Prof. Komal Chauhan
Member Secretary
IECHR

Prof. Mini Sheth
Chairperson
IECHR

**Chair Person
IECHR**
Faculty of Family & Community Sciences
The Maharaja Sayajirao University of Baroda

APPENDIX II

PERMISSION LETTER

Permission Letter from Nagar Prathmik Shikshan Samiti

DEPARTMENT OF FAMILY AND COMMUNITY RESOURCES MANAGEMENT
FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA
NAAC ACCREDITED "A" GRADE

PERMISSION LETTER

To,
Director/Inchsrge.
Nagar Prathmik Shikshan Samiti,
Vadodara.
Gujarat.

Respected Sir/Madam,
Myself Tisha Mistry, Sr. M.Sc. student of The Department of Family and Community Resources Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara. For the partial fulfilment of my master's degree, I am conducting research on **"ASSESSING INTERIOR DESIGN ASPECTS OF A CLASSROOM AND PROPOSING SUITABLE DESIGN FOR SELECTED MUNICIPAL SCHOOL OF VADODARA CITY".**
The objectives of my study are:

1. To assess the interior design aspects of classroom in selected Municipal Schools of Vadodara city.
2. To identify level of problems faced by school teachers with regards to aspects of interior design in classroom of selected Municipal Schools of Vadodara city.
3. To propose suitable design of the classroom taking into consideration all interior design aspects as well as problems faced teachers.

In order to collect data for my study, we need the responses from the school teachers who are serving in the school for more than 5 years as well as to observe classrooms with regards to interior design aspects. Hence, I request you to give me permission to contact the principal of the schools. I asure you that all efforts to protect your identity and keep the information confidential will be taken care of.

If you have any further questions concerning this study, please feel free to contact me through
Phone no: 9265324964
Email id: tisha12mistry@gmail.com
Your permission will be greatly appreciated.

Signature of Director/Incharge:
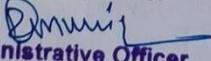
Administrative Officer
Municipal School Board
Vadodara

Ms. Tisha Mistry
M.Sc. (F.C.Sc.) Research Student
Department of FCRM
FFCSc., MSU
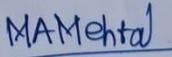
MAMehta

Dr. Mona Mehta
Research Guide & Assistant Professor
Department of FCRM
FFCSc., MSU

Permission Letter from School 1

NAAC Accredited 'A+' Grade

DEPARTMENT OF FAMILY AND COMMUNITY RESOURCE MANAGEMENT
FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

PERMISSION LETTER

To,
Principal,
Dr. Hansa Mehta Primary School,
Vadsar, Vadodara, Gujarat.

Respected Sir/Madam,
Myself Tisha Mistry, Sr. M.Sc. student of The Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara. For the partial fulfilment of my master's degree, I am conducting research on **"ASSESSING INTERIOR DESIGN ASPECTS OF A CLASSROOM AND PROPOSING SUITABLE DESIGN FOR SELECTED MUNICIPAL SCHOOL OF VADODARA CITY".**
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2. To identify level of problems faced by school teachers with regards to aspects of interior design in classroom of selected Municipal Schools of Vadodara city.
3. To assess the opinion of school teachers regarding existing interior design aspects in the classroom of selected Municipal Schools of Vadodara city.
4. To propose suitable design of the classroom taking into consideration all interior design aspects.

In order to collect data, I need the responses from the school teachers who are serving in the school for more than 5 years. Hence, I request you to allow me to contact the teachers. I assure you that every effort will be made to safeguard your identity and maintain the confidentiality of the information provided.
If you have any further questions concerning this study, please feel free to contact me through
Phone no: 9265324964
Email id: tisha12mistry@gmail.com
Your permission will be greatly appreciated.

Signature of School Principal: _____

Research Scholar	Research Guide
Ms. Tisha Mistry	**Dr. Mona Mehta**
M.Sc. Student	Assistant Professor
Department of FCRM	Department of FCRM
FFCSc., MSU	FFCSc., MSU

Permission Letter from School 2

सत्यं शिवं सुन्दरम्
Estd. 1949

NAAC Accredited 'A+' Grade

DEPARTMENT OF FAMILY AND COMMUNITY RESOURCE MANAGEMENT
FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

PERMISSION LETTER

To,
Principal,
Maa Bharti Primary School,
Akota, Vadodara, Gujarat.

Respected Sir/Madam,
Myself Tisha Mistry, Sr. M.Sc. student of The Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara. For the partial fulfilment of my master's degree, I am conducting research on **"ASSESSING INTERIOR DESIGN ASPECTS OF A CLASSROOM AND PROPOSING SUITABLE DESIGN FOR SELECTED MUNICIPAL SCHOOL OF VADODARA CITY"**.

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If you have any further questions concerning this study, please feel free to contact me through
Phone no: 9265324964
Email id: tisha12mistry@gmail.com
Your permission will be greatly appreciated.

Signature of School Principal: _____

આચાર્ય
માં ભારતી પ્રા શાળા
સયાજીગંજ-5

Research Scholar   Research Guide
Ms. Tisha Mistry   **Dr. Mona Mehta**
M.Sc. Student   Assistant Professor
Department of FCRM   Department of FCRM
FFCSc., MSU   FFCSc., MSU

Permission Letter from School 3

NAAC Accredited 'A+' Grade

DEPARTMENT OF FAMILY AND COMMUNITY RESOURCE MANAGEMENT
FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

PERMISSION LETTER

To,
Principal,
Kavi Dula Kag Primary School,
Harni-Warasiya ring road,
Vadodara, Gujarat.

Respected Sir/Madam,

Myself Tisha Mistry, Sr. M.Sc. student of The Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara. For the partial fulfilment of my master's degree, I am conducting research on **"ASSESSING INTERIOR DESIGN ASPECTS OF A CLASSROOM AND PROPOSING SUITABLE DESIGN FOR SELECTED MUNICIPAL SCHOOL OF VADODARA CITY".**

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1. To assess the interior design aspects of classroom in selected Municipal Schools of Vadodara city.
2. To identify level of problems faced by school teachers with regards to aspects of interior design in classroom of selected Municipal Schools of Vadodara city.
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Phone no: 9265324964
Email id: tisha12mistry@gmail.com
Your permission will be greatly appreciated.

Signature of School Principal: _____

Research Scholar
Ms. Tisha Mistry
M.Sc. Student
Department of FCRM
FFCSc., MSU

Research Guide
Dr. Mona Mehta
Assistant Professor
Department of FCRM
FFCSc., MSU

Permission Letter from School 4

सत्यं शिवं सुन्दरम्
Estd. 1949
NAAC Accredited 'A+' Grade

DEPARTMENT OF FAMILY AND COMMUNITY RESOURCE MANAGEMENT
FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

PERMISSION LETTER

To,
Principal,
Pramukh Swami Maharaj Primary School,
Sama gam, Vadodara, Gujarat.

Respected Sir/Madam,
Myself Tisha Mistry, Sr. M.Sc. student of The Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara. For the partial fulfilment of my master's degree, I am conducting research on **"ASSESSING INTERIOR DESIGN ASPECTS OF A CLASSROOM AND PROPOSING SUITABLE DESIGN FOR SELECTED MUNICIPAL SCHOOL OF VADODARA CITY".**
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If you have any further questions concerning this study, please feel free to contact me through
Phone no: 9265324964
Email id: tisha12mistry@gmail.com
Your permission will be greatly appreciated.

Signature of School Principal: _____

Research Scholar	Research Guide
Ms. Tisha Mistry	**Dr. Mona Mehta**
M.Sc. Student	Assistant Professor
Department of FCRM	Department of FCRM
FFCSc., MSU	FFCSc., MSU

Permission Letter from School 5

NAAC Accredited 'A+' Grade

DEPARTMENT OF FAMILY AND COMMUNITY RESOURCE MANAGEMENT
FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

PERMISSION LETTER

To,
Principal,
Pandit Dindayal Upadhyay Primary School,
Chhani, Vadodara, Gujarat.

Respected Sir/Madam,
Myself Tisha Mistry, Sr. M.Sc. student of The Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara. For the partial fulfilment of my master's degree, I am conducting research on **"ASSESSING INTERIOR DESIGN ASPECTS OF A CLASSROOM AND PROPOSING SUITABLE DESIGN FOR SELECTED MUNICIPAL SCHOOL OF VADODARA CITY".**
The objectives of my study are:
1. To assess the interior design aspects of classroom in selected Municipal Schools of Vadodara city.
2. To identify level of problems faced by school teachers with regards to aspects of interior design in classroom of selected Municipal Schools of Vadodara city.
3. To assess the opinion of school teachers regarding existing interior design aspects in the classroom of selected Municipal Schools of Vadodara city.
4. To propose suitable design of the classroom taking into consideration all interior design aspects.

In order to collect data, I need the responses from the school teachers who are serving in the school for more than 5 years. Hence, I request you to allow me to contact the teachers. I assure you that every effort will be made to safeguard your identity and maintain the confidentiality of the information provided.
If you have any further questions concerning this study, please feel free to contact me through
Phone no: 9265324964
Email id: tisha12mistry@gmail.com
Your permission will be greatly appreciated.

Signature of School Principal

Principal
N. P. Sayajigunj School No.-52
(PMSHRI)
Research Scholar   TP-13, Fulvadi, Vadodara-02.
Ms. Tisha Mistry
M.Sc. Student
Department of FCRM
FFCSc., MSU

MAMehta

Research Guide
Dr. Mona Mehta
Assistant Professor
Department of FCRM
FFCSc., MSU

APPENDIX III

INFORM CONSENT FORM

NAAC Accredited 'A+' Grade

DEPARTMENT OF FAMILY AND COMMUNITY RESOURCE MANAGEMENT
FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

INFORMED CONSENT FORM

Respected Sir/Madam,

Myself Tisha Mistry, Sr. M.Sc. student of The Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara, is committed to ensuring the protection of human participants involved in research. For the partial fulfilment of my master's degree, I am conducting research on **"ASSESSING INTERIOR DESIGN ASPECTS OF A CLASSROOM AND PROPOSING SUITABLE DESIGN FOR SELECTED MUNICIPAL SCHOOL OF VADODARA CITY"**.

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3. To assess the opinion of school teachers regarding existing interior design aspects in the classroom of selected Municipal Schools of Vadodara city.
4. To propose suitable design of the classroom taking into consideration all interior design aspects.

This document provides details about the research, allowing you to make an informed decision about participating. If you agree to participate, you will be asked to complete a questionnaire and provide basic background information, such as your name, age, and educational level. I am highly interested in understanding your experiences and gathering your insights. Please note that your participation in this study is entirely voluntary. Every effort will be made to protect your identity and keep your information confidential. Only the researcher will have access to your responses. Your personal information will only be used to contact you, and your name will not be associated with any research findings. If, at any point during the study, you feel uncomfortable, you may withdraw from the study immediately without any consequences.

If you have any further queries concerning this study, please feel free to contact me via:
Phone: 9265324964
Email: tisha12mistry@gmail.com

To participate, please place a tick mark on "I Agree" to complete the feedback form for the research study.
Your participation will be greatly appreciated.

- ☑ I AGREE
- O I DISAGREE

Participant's Name & Signature: _____   Date: _____

Research Scholar
Ms. Tisha Mistry
M.Sc. Student
Department of FCRM
FFCSc., MSU

Research Guide
Dr. Mona Mehta
Assistant Professor
Department of FCRM
FFCSc., MSU

APPENDIX IV

SECTION I

OBSERVATION SHEET   **Date:** _____

A. Background Information of the School: (to be collected from Owner/Manager of the school.)

1. Name of the School: _____

2. Address: _____

3. Contact no. _____

4. Email: _____

5. Ownership of the building for the school: _____

6. Year of establishment: _____

7. Working hours of the school: _____

B. General Information of the classroom:

- **Classroom Details:**

  - Class Name/Number: _____

  - Levels/floors:

    - ❑ Ground Floor   ❑ Second Floor

    - ❑ First Floor   ❑ Other: _____

- **Shape of Classroom:**

  - ❑ Square

  - ❑ Rectangular

  - ❑ Other (specify): _____

- **Size of Classroom:**

  - Length: _____ feet

  - Width: _____ feet

  - Height: _____ feet

  - Total Area: _____ square feet

C. Interior design aspects of the classroom

- **Surface Treatment:**

	Material	Colour	Colour intensity		Finish	Condition			Remark
			Light	Dark		Good	Average	Bad	
Ceiling									
False ceiling									

	Material	Colour	Colour intensity		Finish	Condition			Remark
			Light	Dark		Good	Average	Bad	
North wall									
South wall									
East wall									
West wall									

	Material	Colour	Colour intensity		Finish	Condition			Remark
			Light	Dark		Good	Average	Bad	
Floor									

- **Furniture & furnishings:**

Item name	Quantity	Furniture			Furnishings		Condition			Remark
		Base material	Finishing Material	Colour	Material	Colour	Good	Average	Bad	
Teacher's desk										
Teacher's chair										
Student desks										
Chairs										
Bench										
Blackboard										
Bulletin Boards										
Storage Units										
Book shelf										
Partition wall										
Curtain										
Rugs/ Carpets										

- **Arrangement of Furniture: (Document as a drawing or photographs.)**

  ❑ Rows

  ❑ Groups

  ❑ Other (specify): _____

- **Interior accessories/ Decorative Elements:**

Item name	Quantity	Base material	Colour	Finish	Remark
Plant					
Photo frame					
Wall clock					
Calendar					

- **Natural Lighting Through:**

  ❑ Doors

  ❑ Windows

  ❑ Ventilation

  ❑ Other (specify): _____

- **Artificial Lighting:**

Medium of lighting	Available		Placement of Light fixture		Quantity	Remark
	Yes	No	Wall	Ceiling		
LED						
Tube light						
Bulb						

- **Fan**

	Available		Placement of Fan fixture		Quantity	Remark
	Yes	No	Wall	Ceiling		
Fan 1						
Fan 2						

- **Doors, Windows and Ventilation:**

	Size (LxBxH)	Quantity	Base material		Finish		Safety grill		Condition			Remark
			Frame	Shutter	Frame	Shutter	Yes	No	Good	Average	Bad	
Single door												
Double door												
Sliding door												
Window 1												
Window 2												
Ventilation												

D. Electrical and Telecommunication Services in the Classroom:

Digital devices	Available		Quantity	Remark
	Yes	No		
Interactive whiteboard				
Television				
Projector				
Projector screen				
Audio system				
CCTV camera				
Microphones				
Amplifier				

Electrical fixture	Available		Quantity	Remark
	Yes	No		
Adequate Outlets or switch board				
USB Ports				
HDMI cable				
LAN cable				

Telecommunication Services	Available		Quantity	Remark
	Yes	No		
Video Conferencing Facilities				
1. Camera				
2. Microphone				
3. Earphones				
4. Tripods				
Internet service providers				
WIFI				
LAN (Local area network)				

E. Additional Interior Design Features for the Classroom

Accessibility Features	Available		Remark
	Yes	**No**	
Wheelchair Accessibility			
Adjustable Furniture			
Fire safety measures			

Seating Capacity	Maximum Number of Students	Current Number of Students	Remark
Number of Students			

Occupancy Comfort	Yes	No	Remark
Flexibility in movement around the classroom			
Adequate Ventilation in the room			
Adequate Lighting in the room			
Room is free from distracting noise			

Remark:

_____

_____

SECTION II

INTERVIEW SCHEDULE

Respondent no.: _____

Name of the School: _____

A. Background Information of the Respondent

1. Name of respondent: _____

2. Contact no. _____

3. Email: _____

4. Age (in years): _____

5. Gender:

   ❑ Male   ❑ Female

6. Educational qualification of the respondent:

   ❑ Diploma

   ❑ Graduate

   ❑ Post-graduate

   ❑ Ph.D.

   ❑ Other Specialized Qualification (Mention): _____

7. Number of working hours at the school: _____

8. Years of Work Experience in the school: _____

B. Extent of Problems experienced by the school teachers regarding the Existing Design of Classroom in selected Municipal Schools of Vadodara City.

Kindly report the problems experienced regarding various design components in relation to Placement/ arrangement, Quantity/ Numbers, Size/ Dimensions, Material/ Finish, Ease of Use/ operability, Accessibility, Safety/ security/ well-being and Maintenance/ Present condition and Aesthetics, by indicating the extent of problem as follows: 1 –No problem

2 – Minor problem

3 – Major problem

	Components	Problems experienced related to various aspects of Classroom Design							Description/ Remarks/ Comments
		Size/ Dimensions	Material/ Finish	Ease of Use/ operability	Safety/ security	Maintenance/ Present condition	Aesthetics	Overall Comfort Level	
1. Interior Aspects									
	A. Surface Treatment:								
•	Walls								
•	Flooring								
•	Ceiling								

Components	Problems experienced related to various aspects of Classroom Design										Description/ Remarks/ Comments
	Placement/ arrangement	Quantity/ Numbers	Size/ Dimensions	Material/ Finish	Ease of Use/ operability	Accessibility	Safety/ security	Maintenance/ Present condition	Aesthetics	Overall Comfort Level	
B. Furniture:											
• Desks (Teacher)											
• Chair (Teacher)											
• Bench (Student)											
• Storage unit											

Components	Problems experienced related to various aspects of Classroom Design							Description/ Remarks/ Comments
	Placement/ arrangement	Quantity/ Numbers	Size/ Dimensions	Material/ Finish	Accessibility	Maintenance/ Present condition	Overall Comfort Level	
• Blackboard								
• Bulletin board								

	Components	Problems experienced related to various aspects of Classroom Design									Description/ Remarks/ Comments
		Placement/ arrangement	Quantity/ Numbers	Size/ Dimensions	Material/ Finish	Ease of Use/ operability	Safety/ security	Maintenance/ Present condition	Aesthetics	Overall Comfort Level	
•	Door										
•	Window										
•	Ventilation										

	Components	Problems experienced related to various aspects of Classroom Design			Description/ Remarks/ Comments
		Placement/ arrangement	Quantity/ Numbers	Size/ Dimensions	
C. Accessories/Decorative Elements					
•	Calendar				
•	Wall clock				

	Components	Problems experienced related to various aspects of Classroom Design					Description/ Remarks/ Comments
		Placement/ arrangement	Quantity/ Numbers	Size/ Dimensions	Material/ Finish	Overall Comfort Level	
D. Artificial Light and Fan							
•	Artificial light						
•	Fan						

	Components	Problems experienced related to various aspects of Classroom Design				Description/ Remarks/ Comments
		Placement/ arrangement	Ease of Use/ operability	Maintenance/ Present condition	Overall Comfort Level	
2. **Digital Infrastructure**						
	A. Digital Devices					
•	Projector					
•	Projector screen					
•	Television					
•	CCTV camera					
•	Speaker					

	Components	Problems experienced related to various aspects of Classroom Design						Description/ Remarks/ Comments
		Placement/ arrangement	Quantity/ Numbers	Ease of Use/ operability	Safety/ security	Maintenance/ Present condition	Overall Comfort Level	
	B. Electrical Fixture							
•	Switch board							
•	HDMI cable							
•	LAN cable							

SECTION III

OPINION SCALE

Opinion of school teachers regarding the Existing Interior Design of Classroom in selected Municipal Schools of Vadodara City.

Kindly put a tick mark (✓) against each item.

Sr. No.	Statements	Agree	Neutral	Disagree
1.	The overall aesthetic of the classroom is inviting for students.			
2.	The classroom has adequate artificial lighting.			
3.	The classroom has sufficient access to natural light.			
4.	The sound in the classroom is well-controlled, making it quieter and reducing distractions.			
5.	The colour scheme in the classroom creates a helpful learning environment.			
6.	The classroom layout allows for easy movement.			
7.	The classroom layout allows for easy flexibility.			
8.	The furniture in the classroom is comfortable.			
9.	The classroom design effectively minimizes glare.			
10.	The temperature in the classroom is keeping students comfortable.			
11.	The classroom is effectively ventilated, ensuring good air circulation.			
12.	Safety features such as rounded furniture edges are adequately implemented in the classroom.			
13.	Safety features such as non-slip floors are adequately implemented in the classroom furniture.			
14.	The entrances and exits in the classroom are designed for easy and safe movement.			
15.	The windows are positioned to provide sufficient natural light without causing glare on screens.			

ABSTRACT

ABSTRACT

The present study, titled "Assessing Interior Design Aspects of Classrooms and Proposing Suitable Design for Selected Municipal Schools of Vadodara City," was conducted to evaluate the existing interior design of classrooms in municipal schools of Vadodara and develop suitable recommendations for improvement. The primary objective of this research was to assess the classroom design aspects, determine the extent of problems faced by teachers, analyze their opinions on the existing classroom layout, and propose an improved design that enhances functionality, comfort, and aesthetics.

A descriptive research design was adopted for the study, which involved a structured approach to data collection and analysis. The study was conducted in Vadodara City, Gujarat, India, focusing on five selected municipal schools. The sample size for this study comprised 80 school teachers from these schools, ensuring a comprehensive representation of the teaching community. A purposive sampling technique was employed for data collection, as it allowed the selection of respondents who had firsthand experience with classroom design and its impact on teaching and learning.

The research utilized multiple tools for data collection, including an observation sheet, an interview schedule, and a structured questionnaire. The observation sheet was used to systematically document various interior aspects of classrooms, such as walls, floors, ceilings, furniture, lighting, ventilation, electrical and telecommunication services, accessibility, and overall comfort. The interview schedule aimed to identify specific problems faced by teachers regarding classroom design, while the questionnaire was designed to assess their opinions. A 3-point summated rating scale was used to evaluate the extent of problems, and a 3-point Likert scale (Agree, Neutral, Disagree) was used to capture teachers' perspectives on classroom design. The validity of these research tools was established by consulting a panel of experts from The Maharaja Sayajirao University of Baroda and experienced professionals in interior design and architecture. The reliability of the selected scales was verified using Cronbach's alpha, which yielded a reliability value of 0.89, ensuring consistency in measurement.

The study assessed classroom interior design in selected municipal schools of Vadodara City, identifying problem faced by teachers and proposing an improved design. The demographic analysis of 80 respondents revealed that the 56.25 percent were aged 36-45 years, with female teachers was 68.75 percent outnumbering males. Most teachers had extensive experience, working 5-6 hours daily.

Key problem in classroom design included poor ceiling ventilation and temperature control 56.25 percent, inadequate lighting and fan placement 60 percent, and discomfort due to poorly placed desks and benches 52.5 percent. Additional concerns involved cracked walls, peeling paint, inefficient digital infrastructure, and obstructed movement due to poor furniture arrangement. While 46.25 percent of teachers appreciated natural lighting, only 27.5 percent found air circulation adequate, and 21.25 percent held an unfavorable opinion of the existing design.

To address these challenges, the proposed redesign incorporated off-white vitrified tile flooring, Gypsum Armstrong false ceilings for insulation, and a balanced color scheme using light gray and Buckland Blue. Furniture was rearranged for better accessibility, with improved ventilation, properly placed blackboards, storage units, and educational bulletin boards. Enhanced digital infrastructure, including projectors, speakers, and CCTV cameras, was also integrated.

The estimated cost for the redesign was ₹2,52,250, covering furniture, electrical fixtures, flooring, and wall treatments. The study emphasizes the urgent need for classroom infrastructure improvements to create a safer, more comfortable, and conducive learning environment in Vadodara's municipal schools.