



Revitalisation through Design: Opportunity for Sustainable Intervention

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Focus: Government Schools and District Institute of Education and Training

We shape our buildings: Thereafter they shape us. *Winston Churchill*

Introduction

Spatial configurations have a long-standing influence on how we function, affecting human behavior and determining overall building performance and sustainability. Well-crafted spaces enhance productivity and positively impact operations. Well-arranged and connected spaces are crucial in homes, businesses, and public buildings to create productive, healthy, and functional environments.

The impact of architecture on educational spaces is significant. Thoughtfully designed educational buildings, from schools to universities, influence learning outcomes, community development, and sustainability. They contribute to improved education quality, mental health, and

inclusiveness by creating collaborative spaces, promoting wellbeing, and ensuring accessibility.

The Karnataka government owns various educational facilities, from primary schools to higher education institutions, managed by bodies like the Department of Primary and Secondary Education, the Department of Higher Education, and other specialised institutions. Recently, there has been a strong focus on upgrading these facilities to improve education quality, accessibility, and modernise infrastructure.

The authors have been part of and led several projects in Karnataka for renovations and new constructions, including proposals to upgrade Karnataka Public Schools (KPS) in Bengaluru and District Institutes of Education and Training (DIETs) across Karnataka. The architectural planning process yielded significant cost savings reducing the initial estimates of the 16 schools by 19%. Specifically, we reduced



A school before and after the redesign

the initial INR 85 crore estimate for schools by 19% and the initial INR 50.51 crore estimate for DIETs by 12%.

Based on the experiences of working on 10-15 similar projects, the authors have

developed strategies for renovations and new constructions, creating a toolkit for sustainable, cost-effective, and contextual interventions. These strategies align with the National Education Policy (NEP) 2020, which prioritises high-quality infrastructure.

Need for engagement

Educational infrastructure, particularly schools in our country, is at a critical juncture. While adequate physical infrastructure exists, its usage and value urgently need evaluation. Many structures require renovation, and new projects are being planned. A sensible, systematic, and adaptable design approach—rooted in climatic, social, and cultural contexts—is essential to ensure functionality and the long-term sustainability of the proposed infrastructure.

This article outlines a methodology to achieve these goals through a staged and planned approach to assessing, renovating, and developing existing infrastructure. It is also important to emphasise the role of quality-assured implementation during construction, along with regular maintenance and post-construction monitoring to ensure project success. These principles can be applied specifically to school redevelopment and to all educational premises in general.

1. Assessment

This is the most crucial part in any project and lays the roadmap for successful implementation. Most schools are either single or two-storied standalone linear buildings and there are usually a group of 2-3 such structures including different grades in one campus built over different periods in time.

Initial assessment of a school: Key considerations

An effective initial assessment of a school involves both physical surveys and a detailed analysis of current and projected requirements.

Building documentation and structural assessment

Many schools and their governing bodies

lack access to building plans and structural documentation. As a first step, it is crucial to create a comprehensive database of drawings for the campus. This should include site plans and site levels, plumbing and electrical infrastructure and detailed layouts of existing buildings. Additionally, a structural assessment must be conducted to evaluate the buildings' potential for future expansion. Without understanding the overall layout, structural systems, and service infrastructure, any alterations risk being short-term fixes that fail to support long-term development goals. It's also important to gather input from teachers, students, and community members to understand their specific needs and expectations for the spaces. This can be done through surveys, interviews, and workshops, which will inform the design process more effectively.

Functional space and future needs analysis

A comprehensive inventory of all functional spaces should be created, detailing their current usage and area requirements. This inventory should also include projections for future needs, such as upgraded infrastructure necessitated by digitisation or curriculum expansion. A thorough assessment of these requirements will help prevent unnecessary rework and ensure that development aligns with the school's long-term objectives. By focusing on these critical areas, schools can establish a solid foundation for informed and sustainable development planning.

2. Renovation

It has been observed that most school buildings and their sites are adequate to provide for the stated requirements. This challenges the assumption that new construction is always necessary and suggests that *renovation* and optimisation of existing spaces can be highly effective. Poor maintenance and a lack of awareness

regarding the functional usage of the buildings, in most cases, result in underutilisation. Addressing these issues alone can significantly improve school functioning without requiring extensive intervention.

Optimising existing spaces in schools: Key considerations

Effective space optimisation in schools requires thoughtful planning and strategic modifications.

Flexible use of interior spaces

In frame-structured buildings (without load-bearing walls), spaces can be reconfigured by demolishing or adding walls. Strategic placement of partitions, doors, and windows could add and enhance functionality and make spaces more practical. Unused corners or underutilised spaces can be repurposed by assigning specific functions or integrating them with existing areas. Modifications prioritising daylight access and thermal comfort for all habitable spaces could be ensured.



Terrace space used for multiple purposes like mid-day meal for the secondary stage, yoga, art, craft and other activities

Promoting multi-functionality

Flexibility in space usage, where areas are allocated for multiple functions, reduces underutilisation. Single-use spaces often lead to inefficiency and negative spaces, impacting user experience. Opening classrooms to courtyards or adjacent outdoor areas to extend usable space seamlessly could be explored.

Optimising outdoor and transitional areas

Utilise areas immediately adjacent to the school building or its grounds by integrating outdoor areas into functional designs. Buildings could be connected through programmed outdoor spaces to create additional usable areas without extensive construction.



Optimising outdoor spaces by integrating functional areas for better use without extensive construction

Sustainable renovation practices

To ensure both sustainability and longevity, natural and locally sourced materials could be selected. Also, inclusion of local crafts and building techniques to give the school a distinct identity while simultaneously supporting regional craftsmanship. Wherever possible, reusing materials from the existing structure, such as bricks, timber, and steel, to reduce waste and improve cost-efficiency. Prioritising inclusive design

by ensuring accessibility for all students, including those with disabilities, through features like ramps, wider doors, and adaptive furniture.

Colour and graphics

Strategic use of colour and graphics can significantly enhance a building's visual appeal and identity, adding value at minimal cost. This can also create internal landmarks, highlighting and defining different spaces such as classrooms, libraries, corridors, and play areas.



Colours can enhance a building's visual appeal

By focusing on these strategies, schools can maximise their existing spaces efficiently and sustainably while enhancing the overall user experience.

3. Development

A cohesive design response involves proposing further development alongside renovations. A significant portion of school development proposals focuses on designing open spaces, a crucial aspect often underutilised due to a lack of effective programming. Furthermore, prioritising climate-responsive features that help regulate and harness sunlight, wind movement, and rainwater is essential for the long-term cost-efficient operation of the school.

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Opportunity for growth: Key considerations

The overarching goal is to provide sustainable guidelines that leverage existing infrastructure, address climatic conditions, and ensure cost sensitivity.

Enhance the entrance

Create a distinct identity and arrival experience for each school, integrating all structures within the campus. This approach establishes a unified visual and functional character.

Enhance existing footprint

In cases requiring new construction (e.g., additional rooms, blocks, or walkways), ensure the design aligns with existing movement patterns and programmatic requirements, adding value to the overall campus layout.

Define and articulate outdoor spaces

Outdoor spaces play a pivotal role in the functionality of schools. Connect buildings through programmed outdoor spaces to create additional usable areas without extensive construction.

Climate responsiveness

Architectural responses to local microclimates—such as shaded corridors, large roof overhangs (based

on local climatic conditions), and scaled courtyards—improve energy efficiency, enhance occupant comfort, and minimise environmental impact.

Sustainable site development

Emphasise sustainable site practices, including rainwater harvesting, effective water management, and adequate vegetation. Maximise open spaces for functional and recreational use while promoting responsible land management to benefit the institution, environment, and community.

Sustainable systems integration

Integrating sustainable systems such as solar panels, rainwater harvesting, and efficient waste management practices should be prioritised in new developments. This could include energy-efficient HVAC systems and LED lighting to reduce long-term operational costs.

4. Implementation

This phase is crucial for aligning school development with its vision and long-term objectives. Meticulous detailed specifications are essential, and their correct implementation should be a shared responsibility among all stakeholders, including school leadership, project managers, architects, educators, and community representatives.

- Material selection and quality assurance are essential. Project managers must conduct thorough quality checks to ensure all materials meet required standards and project specifications. This includes verifying material durability, sustainability, and safety to create robust and long-lasting infrastructure.
- Accountability measures should also be put in place, with periodic progress

reviews and open discussions to ensure that the vision remains central to the development process.

- Regular and systematic monitoring should be established to ensure adherence to the specifications at every stage of the project.

5. Maintenance and Monitoring

By embedding routine maintenance into the school's operational strategy, stakeholders can ensure the infrastructure remains durable, reliable, and aligned with the institution's long-term goals.

A proactive approach to maintenance enables schools to address minor issues before they escalate into major problems, ensuring that resources are utilised efficiently. Maintenance plans should include regular inspections of structural components, AC systems, electrical and plumbing systems, and other critical utilities. Adopting sustainable practices, such as using energy-efficient systems and environmentally friendly materials during repairs and upgrades, can further contribute to long-term cost savings.

By prioritising routine monitoring and upkeep, schools can ensure that buildings, utilities, and outdoor spaces remain in optimal condition, minimising the risk of unexpected failures or costly emergency repairs. Post-occupancy evaluations should be conducted after the building is completed and occupied to ensure effective space utilisation and identify any design flaws early on. This can help ensure that the space continues to meet educational needs long after construction is completed.

Learnings and Implementation

This intervention strategy that involves assessment, renovation and development, provides a blueprint for re-looking at the

schools and other educational spaces. Key considerations include:

Preserving context

Respect cultural, historical, and environmental contexts while incorporating modern elements.

Community engagement

Engage local stakeholders (teachers, students, and residents) early in the design process to ensure cultural sensitivity and align with user needs. Modernisation efforts should incorporate local artwork, design motifs, and craftsmanship, especially in rural and semi-urban areas, to foster a sense of place.

Environmental metrics

Incorporate measurable outcomes such as energy savings, water conservation, and waste reduction.

Long-term monitoring

Develop mechanisms to evaluate the success of interventions, ensuring continuous improvement and relevance.

Successful revitalisation hinges on collaboration between architects, engineers, user groups, and stakeholders. These partnerships are crucial for creating

inclusive, innovative, and sustainable educational spaces that provide lasting community benefits. Early and continuous stakeholder engagement ensures that the needs and aspirations of everyone involved—educators, students, parents, and community members—are heard and integrated into the project vision. This collaborative approach aligns project goals with users' practical needs, ensuring the final design serves both educational objectives and community priorities.

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A key aspect is designing with a deep understanding of the site's unique context, including local culture, climate, history, and social needs. The design must respond to the specific conditions of the area, enhancing the sense of place while addressing practical concerns like accessibility, environmental impact, and resilience. Considering the surrounding



Design of the District Institute of Education and Training, Shivamogga.

community, local materials, and climate conditions allows us to create spaces that

are not only functional and efficient but also connected to their environment.

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