

Integration of Community Space and Design of Educational Space under Child Friendly Concept

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Abstract: *Starting from the integration of children's educational space and community public space, this article takes Xiangdong Community in Beijing as a case for design practice research. It aims to construct a child-friendly community space system and promote the realization of a child-friendly community. Through a literature review and case analysis, the study reviews domestic and international practices. It then selects Xiangdong Community in Beijing and, guided by child development theory and space-sharing theory, develops a spatial integration design strategy centered on a vertical core and horizontal connections. The study provides a systematic and objective analysis of the relationships among multiple complex stakeholders in the community. It represents a proactive attempt to build a child-friendly community, improving the quality of children's growth environments and the overall level of community development.*

Keywords: Children's educational space, Integration of public space, Space design strategy, Child-friendly community.

1. Introduction

Children represent the future of the nation and the hope of society, and their development directly affects population structure and social sustainability. Against the backdrop of approximately 300 million children in China, urban communities have gradually become a critical setting for children's growth [1]. In current urban communities, children's activity spaces consist primarily of recreational public spaces such as community plazas and children's playgrounds, with functions largely centered on physical activity and everyday leisure, supported by a certain level of basic infrastructure. However, such spaces oriented toward "supervision and recreation" exhibit a degree of fragmentation in terms of functional attributes, spatial layout, and use mechanisms [2]. This functional misalignment with the demands of child-friendly development has become a core challenge in contemporary community planning and construction. Existing children's activity spaces are predominantly composed of plazas and play equipment, with design orientations weighted toward supervision and recreation, resulting in relatively limited functionality and fragmented spatial layouts that fail to adequately address children's multi-layered needs in cognitive development and social interaction. As a critical space for early childhood education, kindergartens tend to confine their functions and resources within their own premises, maintaining insufficient connections with community public spaces. Under the impetus of the "child-friendly city" concept, achieving the organic integration of early childhood educational spaces and community public spaces has emerged as an important pathway for optimizing children's developmental environments. Against this backdrop, this paper adopts a child development perspective to examine the pathways and design methods for constructing composite educational spaces and public spaces. Against the backdrop of this mismatch between children's developmental needs and spatial provision, current community public spaces are predominantly organized around adult-scale design and management logic, leaving children's needs inadequately integrated into the broader spatial system. This has resulted in a pronounced structural and functional separation between children's educational spaces and community public spaces. Constrained by land-use

boundary delineation and enclosed management practices, kindergartens and community public spaces operate with considerable independence in terms of spatial organization and use mechanisms, lacking the necessary interface transitions and permeation pathways. As a result, a continuous and composite spatial use network has yet to take shape, which limits children's opportunities for participation and behavioral extension across different settings and undermines the continuity and experiential integrity of their everyday activities [3].

This study extracts key elements from child development theory concerning children's cognitive, behavioral, and social interaction needs [4], as well as core perspectives on fundamental sharing modes—universal sharing, transfer sharing, and cluster sharing—drawn from public space sharing theory [5]. The Montessori educational theory within child development theory [6] is applied to guide spatial integration design. Building on this foundation, and informed by field research conducted in the Xiangdong community, the study constructs an integrated design framework that combines problem orientation with theoretical support. A spatial integration design strategy of vertical core plus horizontal connection is adopted to establish a replicable design methodology for child-friendly community spaces. This approach yields a layered, shared, and composite community that fosters integration between children and the broader community, forming an interwoven spatial interaction system characterized as "left and right."

2. Analysis of Theoretical Basis and Integration Mechanism

2.1 The Spatial Translation Mechanism of Montessori Educational Philosophy

In research on child development, the spatial environment is regarded as an important educational medium. Montessori's concept of "environment as education" emphasizes promoting children's autonomous learning and inner development through an orderly and manipulable environmental system [7]. Against the backdrop of early childhood educational space extending into community public space, this theory responds

to current problems in which traditional kindergarten spatial design can no longer meet the requirements of advanced educational philosophies, including overly simple layouts of activity units, insufficiently developed planar functions, monotonous spatial forms, a lack of spaces for interaction, and inadequate interaction between the environment and young children [8]. Integrating Montessori educational philosophy with China's cultural characteristics can guide the design of kindergarten spatial environments, helping young children perceive the culture around them, become close to nature, and experience changes in space [9]. Consequently, space shifts from a container with a single function to a proactive medium that intervenes in children's developmental processes, providing translatable design principles for integrating educational space with community public space.

2.2 Public Space Sharing Mechanism and Response Path

Against the backdrop of increasingly complex community space demands, spatially monofunctional models are gradually transitioning toward sharing and collaboration. The use logic of public space has shifted from exclusive occupancy to multi-subject participation and resource integration, providing a mechanism to address problems such as the enclosure of early childhood educational space and the underutilization of community space. The shared mechanism of public space has progressively moved beyond the traditional understanding of binary opposition between public and private, toward a construction of publicness grounded in multi-subject collaborative participation. The essence of public space lies not in its physical attributes but in the publicness formed through the joint action of diverse use subjects and management subjects, the core of which is manifested in the interactive relationships and perceptual construction among multiple subjects [10]. The sharing mechanism is, in essence, a collaborative relationship formed among children, community residents, and management subjects around the rights of spatial use and participation.

Building on the analysis of stakeholder relationships, domestic research further examines the operational dynamics of public space from a governance perspective. Relevant studies indicate that public spaces have progressively developed a "co-governance model" involving the government, market, and community, driving a transition from single-entity provision to multi-stakeholder collaboration [11]. Meanwhile, research on privately owned public spaces demonstrates that the process of spatial use is fundamentally the outcome of negotiation between public

rights and management mechanisms, with publicness realized through activity organization and institutional regulation [12].

On this basis, the spatial response path of the sharing mechanism can be summarized as follows: beginning with usage requirements, translating them into spatial organization through behavioral activities, and sustaining operations through governance and management mechanisms. This pathway aligns with China's public space development orientation of "co-construction, co-governance and shared benefits," and provides a theoretical basis for the "kindergarten-community public space integrated design" proposed in this study—namely, achieving the integration of children's developmental needs and community publicness through multi-stakeholder collaboration.

2.3 Case Analysis of Community Integration in Children's Education

In the ongoing development of child-friendly communities, regional variations exist across different areas in terms of practical implementation.

Taking the South Campus Community of Southwest University in Tiansheng Subdistrict, Beibei District, Chongqing as the subject, relevant research and field surveys indicate that prior to 2021, the community had zero dedicated children's play areas in its public spaces, with only two swings as play equipment. Disorderly vehicle parking and insufficient pedestrian crossing facilities posed threats to children's safety in transit, while the children's home remained largely unknown to residents and was used inefficiently, pointing to an urgent need to improve child-friendliness at the spatial level. Based on the functional needs of each concentric zone, physical spaces for children's well-being were planned through point placement and linear connectivity, thereby revitalizing idle community assets (Figure 1) [13]. A "one core, multiple nodes" community humanistic space system was established, with the women and children's home serving as the primary platform to strengthen the development of women's and children's care services, community-based science popularization and education, sports and health programs, and scholarly culture, while addressing the diverse needs of children, families, and the broader community. This study identifies problems through field investigation, achieves spatial integration via concentric-ring organization, drives system construction through core nodes, and establishes a sustainable sharing mechanism through multi-stakeholder collaboration.



(a) before renovation



(b) after renovation

Figure 1: Comparison pictures of the small park before and after renovation

Taking the Dingli Community in Haidian District, Beijing as a case study, this design systematically proposes an integrated approach to community public space renewal from a child-friendly perspective. The study argues that children's developmental needs should serve as the core around which the diverse use demands of multiple community stakeholders are coordinated. By consolidating dispersed public space resources, a continuous and open spatial system can be established, thereby promoting the organic integration of children's activity spaces with residents' everyday social interaction spaces. In terms of design methodology, the approach emphasizes reducing reliance on traditional single-purpose functional zoning and achieving multi-functional superposition through composite spatial organization, thereby improving the overall utilization efficiency of space. Through the introduction of flexible and adaptable design strategies, spaces are enabled to transition dynamically across different time periods and user groups [14]. At the level of sharing mechanisms, the study emphasizes the joint participation of residents, children, and community managers, forming a continuously optimized pattern of spatial use through co-construction and co-governance. Taking spatial integration as the pathway and

multi-stakeholder collaboration as the foundation, this study enhances the vitality of community public space through functional compounding and time sharing, thereby providing an operationalizable theoretical and methodological reference for the integrated design of educational space and community public space.

3. Analysis of the Current Spatial Situation and Behavioral Characteristics of Xiangdong Community

3.1 Spatial Status Quo and Problem Identification of the Research Object

The Xiangdong Community in Mentougou exhibits the typical characteristics of an old community overall. Its public spaces are primarily oriented toward circulation and basic rest, with scattered sites and monotonous functions, lacking continuous children's activity spaces and systematic safety design, resulting in insufficient spatial vitality. Meanwhile, the community's internal facilities are aging, its interfaces are enclosed, and the levels of neighborhood. (Figure 2).

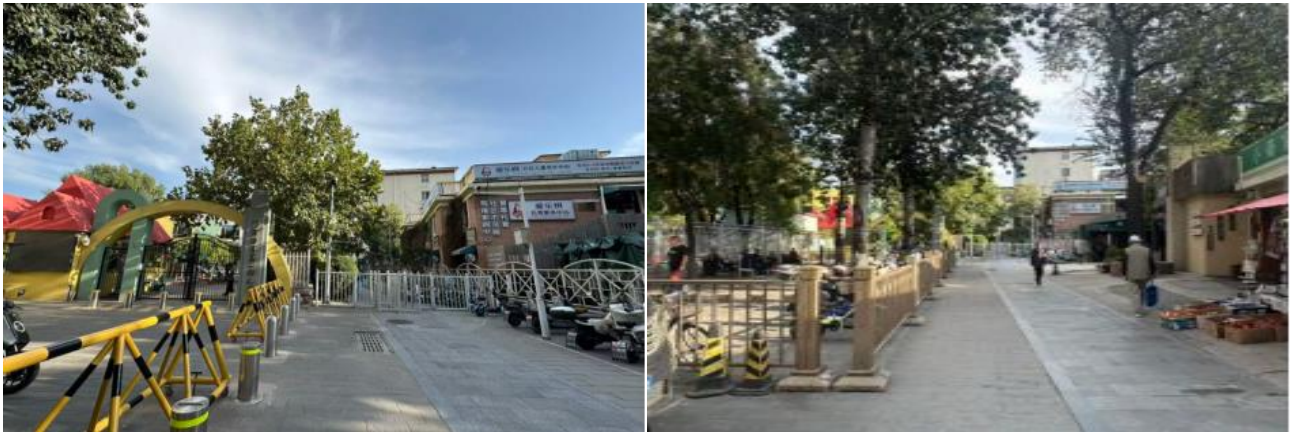


Figure 2: Current status of the site

The adjacent Mentougou No. 1 Kindergarten has relatively well-developed educational space and activity areas, but it is generally managed as a closed facility and lacks effective connections and sharing mechanisms with the community, preventing its educational resources from extending to the surrounding area. The two are clearly separated in terms of space and function. On the one hand, the community lacks high-quality carriers for children's activities and education; on the other hand, the kindergarten's resources are used in a relatively inward-facing manner. Therefore, the site has potential for integration. Through spatial openness and functional integration, it can achieve an organic integration of education and community public space.

3.2 Use the Analysis of Behavioral Characteristics and Activity Patterns of the Population

The population of Xiangdong community consists primarily of elderly residents, parents, and children, whose daily activities center on walking, brief stays, and pick-up and drop-off of children, exhibiting a pattern of high frequency and short duration. Children's activities largely depend on scattered open spaces, lacking safe and continuous spatial environments, while parents have limited time to linger and

interact, resulting in relatively weak community social engagement. The areas surrounding the kindergarten experience periodic pedestrian concentrations during morning and evening rush hours; however, stationary behaviors remain limited in variety, with a lack of extendable public activities and educational participation scenarios.

4. Design Strategies for the Integration of Children's Education Spaces and Community Public Spaces

4.1 Overall Framework of Spatial Design under the Orientation of Integration

This design centers on children's developmental needs and space-sharing mechanisms to establish a composite community space system integrating education, activity, and social interaction. By consolidating kindergarten and community resources and dissolving spatial boundaries, it creates an open and continuous public environment. Building on a foundation of safety and child-responsive design, the scheme incorporates functions of learning, interaction, and community participation, achieving an organic integration of educational and public attributes while fostering

intergenerational inclusion and enhancing community vitality.

4.2 Spatial Structure Integration Strategy Based on “vertical core - horizontal connection”

This design proposes a spatial integration model of “vertical core plus horizontal connection,” constructing an interwoven spatial system oriented “left and right” to address the separation between kindergarten facilities and community

public spaces. In terms of overall structure, a shared staircase serves as the sole vertical core node, transforming it from a purely circulatory element into a composite space that accommodates social interaction and dwell time. Upon entering the site, parents and children naturally diverge: children turn left into the early childhood education spaces, while parents turn right into the community activity center. The vertical circulation space thus becomes a shared interface connecting the two, reinforcing the public character of the overall space and its potential for interaction (Figure 3).

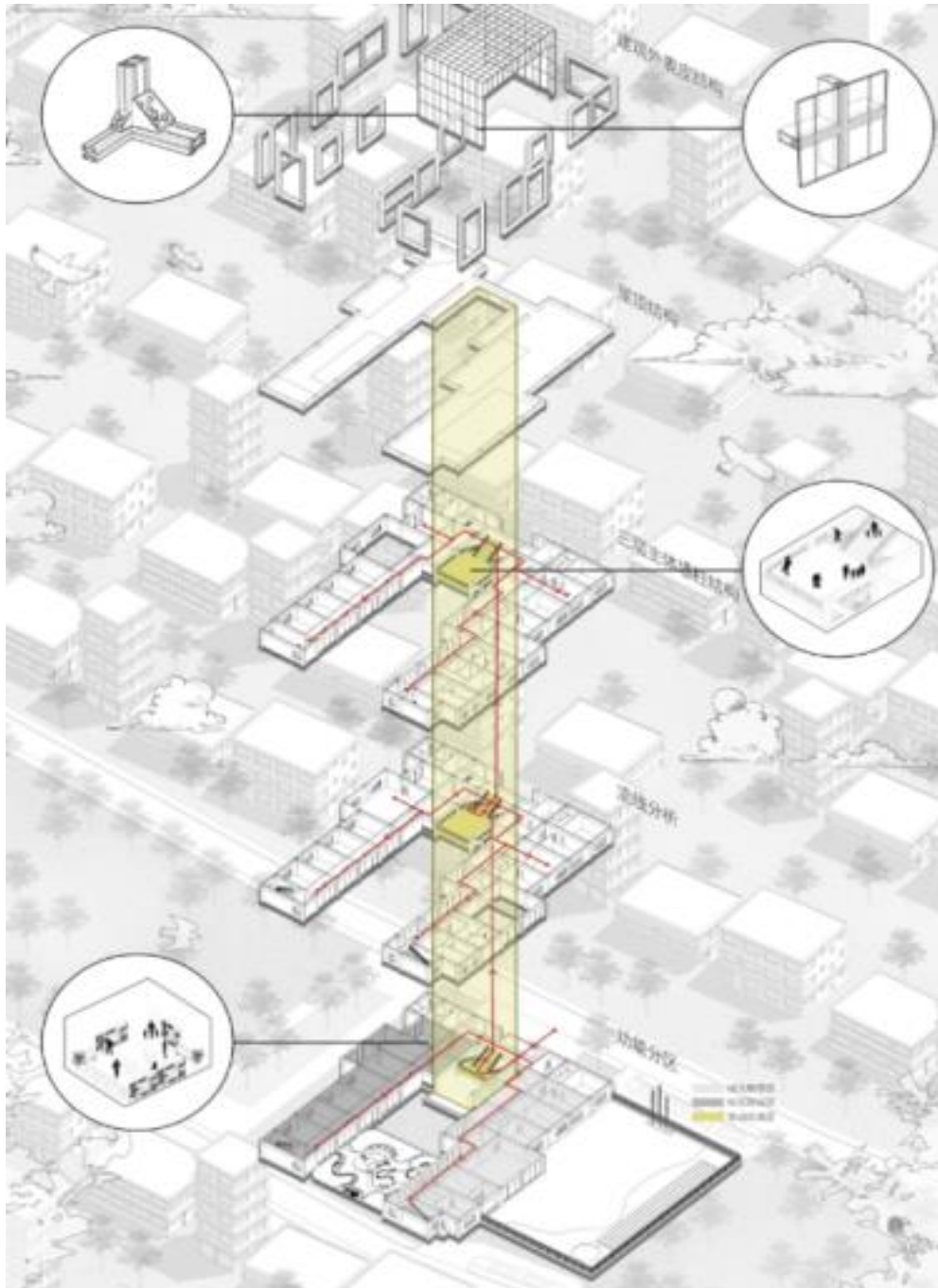


Figure 3: Analysis Diagram of the renovation plans for each floor of the kindergarten

In the horizontal dimension, corridors and open pathways organically link the early childhood zone, community activity areas, and outdoor public spaces. This integration forms a continuous, accessible activity network that facilitates natural encounters among diverse user groups during their daily movement. Through clear functional zoning and circulation guidance, the design ensures organized movement flows that

prevent mutual interference. The treatment of spatial interfaces emphasizes a “visible yet controllable” approach, which safeguards children’s activities while offering parents and community residents opportunities for moderate observation and engagement. Ultimately, the overall spatial structure achieves an integrated development of educational and community functions, fostering daily interactions among

multi-generational groups and enhancing community vitality.

4.3 Strategies for Constructing a Composite Scenario of Education, Games and Social Interaction

To address the disconnect between children's developmental needs and public service functions in community public spaces, the design incorporates outdoor learning spaces to reinforce educational extension, creates exploratory and

interactive spaces to stimulate children's participatory experiences, and introduces community exchange spaces to facilitate interaction among parents and residents. The integration of these diverse settings forms an open and continuous activity environment, establishing a composite scenario system of "education-play-socialization" (Figure 4) that achieves the unification of children's developmental needs and the public attributes of the community.



Figure 4: Analysis Diagram of Composite Scenes

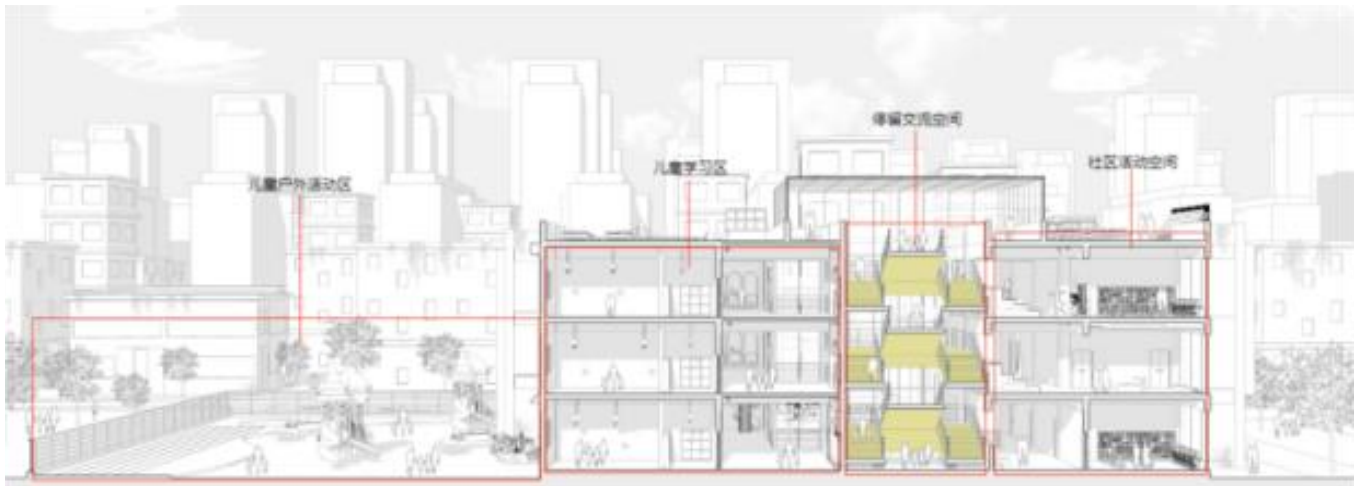


Figure 5: Section Analysis Diagram

4.4 Construction of a Hierarchical Sharing Mechanism Involving Multiple Participants

In this design concept, the key participants include children, parents, and the residents' committee, collectively forming a layered shared mechanism centered on multi-stakeholder engagement. Children, as the primary users, engage mainly in learning and play activities; accordingly, open educational and interactive spaces are pre-designated within activity areas and node spaces to meet their needs for exploration, cognition, and socialization, thereby fostering an experience-oriented environment for growth. At the parental level, the provision of community activity centers and gathering-and-exchange spaces is intended to guide parents' behavior away from the singular act of drop-off and pick-up toward a mode of "accompaniment + socialization," enabling interpersonal exchange, self-development, and stronger family-to-family connections within the shared spaces. At the community level, the residents' committee is expected to fulfill organizational and managerial functions by coordinating activity planning, resource allocation, and the design of daily operational

mechanisms, thereby ensuring the efficient long-term functioning of the spaces. (Figure 5) The three parties form a potentially virtuous interactive relationship within the shared space system established by the design, with the aim of achieving multi-party co-construction, co-governance, and co-sharing, thereby enhancing the overall vitality of the community at the planning level.

4.5 Safety and Spatial Experience Optimization Strategies for Children's Development

By classifying age groups, zones and organizing movement routes, the usage boundaries for different groups of people are clearly defined to reduce cross-interference. By integrating line of sight accessibility and interface control, the spatial visibility and safety are enhanced, and transition buffer Spaces are set up to strengthen protection (Figure 6). At the same time, a comfortable environment is created by using rich colors, friendly materials and natural elements, enhancing children's sense of participation and overall spatial experience.



Figure 6: Renderings

5. Conclusions and Design Application Implications

Drawing on both research synthesis and design practice, the integration of children's educational spaces with community public spaces constitutes not merely a physical reorganization of space but a systemic coordination of functions, behaviors, and governance mechanisms. From a design application perspective, this model offers an actionable pathway for the renewal of aging communities: by activating the spillover effects of educational resources, reinforcing the continuity of public space, and introducing community co-governance mechanisms, it can effectively enhance spatial utilization efficiency and the quality of social interaction. This study further demonstrates that the development of child-friendly communities should shift from the singular provision of facilities toward an integrated "space-service-mechanism" approach, with emphasis on long-term operation and dynamic management.

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