

Museum Design for Urban and Rural Children from the Perspective of Aesthetic Education

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Abstract. Against the backdrop of China's new urbanization and the "Double Reduction" policy, the persistent urban–rural dual structure has resulted in disparities in children's growth environments and educational resources, while the proportion of school-age children engaging with museums continues to increase. However, existing public cultural facilities fail to meet the diverse needs of children from different regions, lacking both a distinct service logic for children and dedicated spaces tailored to them. Current research on children's museums tends to focus on a single dimension, without systematically integrating spatial, functional, and aesthetic education perspectives. In response, this study centers on the goal of *bridging the developmental gap between urban and rural children*. Through an analysis of existing differences between urban and rural children's museums, it constructs a "Urban–Rural Adaptive Design Model for Children's Museums" grounded in the three-dimensional theory of aesthetic education and embeds aesthetic education objectives within the model. The aim is to provide a systematic and operable design strategy for children's museums that reconciles spatial utilization, functional adaptation, and aesthetic education goals. The study proposes a "aesthetic education–space–function" integrative design approach for urban and rural children's museums, enabling children to deepen cognition and enhance cultural literacy through the process of perception–comprehension–creation. This framework offers both theoretical support and methodological guidance for practical museum design, promoting balanced cultural experiences for urban and rural children and contributing new insights to the equalization of public cultural services.

Keywords: aesthetic education, children's museum, urban and rural children, urban–rural adaptive design model.

1. Introduction

With the acceleration of China's new urbanization, the urban–rural dual structure has led to pronounced imbalances in children's developmental environments and educational resources, profoundly influencing the holistic development of the child population [1]. On one hand, urban children—constrained by high-density built environments and increasingly digitalized lifestyles—are experiencing a weakening of their physical contact and emotional connection with natural ecology and local culture. Problems such as "nature-deficit disorder" and "rural-cultural cognition gaps" have gradually become evident. On the other hand, rural children often face limited educational resources and restricted exposure to diverse experiences. Following the comprehensive implementation of the "Double Reduction" policy and the widespread promotion of quality-oriented education, school-aged children (7–12 years old) now account for an increasingly significant proportion of public museum visitors [2].

However, existing standardized public cultural facilities—such as general museums and youth palaces—struggle to meet the emotional and developmental needs of children across different regions [3]. Most institutions lack an independent service logic tailored to children, merely adding explanatory labels or interactive tools within adult-oriented exhibition frameworks to adapt to younger audiences [4]. Independent museums or thematic exhibitions designed specifically around children's cognitive characteristics and experiential needs remain scarce [5]. Although research and practice related to children's museums have increasingly focused on young audiences, existing studies tend to concentrate on isolated dimensions such as management models or functional layouts of children's museums and specialized exhibitions [6]. Systematic integration across spatial perception, functional adaptation, and aesthetic education objectives remains underexplored.

In response to these challenges, this study takes “*bridging the developmental gap between urban and rural children*” as its core goal. By analyzing current disparities in children’s museums between urban and rural contexts, it constructs an Urban–Rural Adaptive Design Model for Children’s Museums grounded in the *three-dimensional theory of aesthetic education*. Aesthetic education objectives are embedded throughout the model to provide a systematic and operable design strategy aimed at reconciling spatial utilization, functional adaptation, and aesthetic education goals. Ultimately, the study seeks to offer theoretical support and methodological guidance for the design and practice of children’s museums, promoting balanced cultural experiences for urban and rural children and contributing new perspectives to the equalization of public cultural services.

2. The Relationship Between Urban–Rural Children’s Museum Design and Aesthetic Education Objectives

2.1. Definition of Core Concepts

2.1.1. Definition of Urban–Rural Children’s Museums

The International Council of Museums (ICOM) defines a *children’s museum* as a museum type whose core service target is children, emphasizing the transmission of knowledge and information to young audiences through diversified exhibition and communication methods. It is a specialized cultural institution that combines educational and interactive functions [7]. Centered on *interactive experience*, a children’s museum is a cultural and educational venue designed specifically for children [8]. Focusing on themes such as science, art, and nature, it encourages children to learn through tactile engagement, manipulation, and play, stimulating curiosity and cultivating hands-on ability, creativity, and cooperation through activities such as experiments, handicrafts, and exploration. At the same time, these museums emphasize parent–child interaction and age-specific education, supporting family participation and promoting cognitive development and holistic growth.

Urban–rural children’s museums should function as both “mediators” and “empowerment spaces,” constructing a bidirectional interactive platform. For urban children, they reconnect them with nature and local culture, compensating for the “deficit of nature.” For rural children, they serve as a window that broadens horizons while reinforcing local cultural identity, inspiring self-confidence and creativity.

2.1.2. The Connotation of Aesthetic Education

As an integral component of holistic education, *aesthetic education* emphasizes the cultivation of perception, emotion, and aesthetic capability. Cai Yuanpei proposed that “education should nurture a complete human being, integrating moral, intellectual, physical, and aesthetic development without bias” [9], positioning aesthetic education as a pathway for intellectual and emotional development beyond mere sensory enjoyment. Zhu Guangqian further emphasized that “beauty is the manifestation of the vitality of life,” arguing that aesthetic education should guide individuals to *discover* and *express* beauty in daily life, thereby enhancing the quality of life [10].

Aesthetic education is closely related to children’s development and serves as a crucial support for their comprehensive growth. It contributes significantly to children’s psychological well-being, social competence, creativity, and cultural identity. Therefore, in the design of urban–rural children’s museums, aesthetic education must be thoroughly integrated to create a culturally rich, inspiring environment where children can explore, learn, and grow freely.

Based on this, the present study conceptualizes aesthetic education as a *dynamic process* encompassing *perception, understanding, and creation*. This cognitive framework serves as a theoretical foundation for modeling and designing cultural spaces for urban and rural children.

2.2. Practical Differences in Aesthetic Education Between Urban and Rural Children

As key venues for implementing aesthetic education, *children’s museums* [11] exhibit distinct differences between urban and rural contexts. These differences are not limited to spatial and resource allocation but also profoundly shape the formation and development of children’s aesthetic experiences.

This study selects *One Forest Children’s Museum* and *ChuanSuo Museum* as representative cases. The former exemplifies an urban children’s museum characterized by immersive interaction and a child-centered philosophy, while the latter represents a rural children’s museum operating under the “Village Museum+” model that promotes the living transmission of culture. Their contrasting spatial narratives, educational content, and aesthetic cultivation pathways provide representative cases for systematically comparing and optimizing the practice of aesthetic education in urban and rural contexts.

One Forest Children’s Museum is founded on *child-centeredness* [12] and *immersive experience* [13], breaking from traditional modes of knowledge transmission. Through interactive forms such as role-play and artistic creation, it supports children’s psychological development, social interaction, and creativity. Role-play enhances empathy, emotional cognition, and communication skills, while art-making fosters imagination and exploratory curiosity. Its spatial design is flexible and child-friendly, using modular “box” units to create non-linear circulation patterns that empower children with autonomy and strengthen their creative expression. Professional facilities and surrounding spaces further support interactive engagement. Moreover, adopting an *unstructured creative environment* concept, the museum collaborates with experts across disciplines to deepen children’s aesthetic education, highlighting the long-term developmental value of early experiential learning.

The *ChuanSuo Museum*, through its “Village Museum+” model, transforms rural museums from “static exhibitions” into “living heritage.” Its core lies in constructing immersive, thematic narrative experiences. By integrating hands-on processes such as “from cotton to fabric” and interactive bamboo craft activities, it creates a ‘*cognition–experience–creation*’ chain that translates cultural knowledge into contextualized everyday practice. Participants gain a deeper understanding of local culture, establish emotional bonds, and reinforce cultural identity, while collaboration fosters social communication and creativity through the innovative application of traditional crafts. Simultaneously, this model combines cultural and industrial values by promoting local creative products through experiential activities, strengthening awareness of the practicality and contemporary relevance of local culture, and consolidating cultural identity. Creative marketing and cooperative promotion further enhance social engagement and innovation, ultimately realizing the *living inheritance of rural culture* [14] and laying the foundation for deepened cultural identification.

Table 1. Comparative Analysis of Children’s Museum Case Studies

Comparison Dimension	One Forest Children’s Museum	ChuanSuo Museum (“Village Museum+” Model)
Core Positioning	Child-centered philosophy focusing on aesthetic education and long-term development	Transformation of rural museums emphasizing the <i>living transmission</i> of local culture
Experience Model	Interactive and open forms (role-play, art creation) that stimulate children’s active exploration	“ <i>Cognition–Experience–Creation</i> ” chain integrating cultural knowledge into contextualized life practice
Core Concept	Unstructured environments that cultivate artistic perception and support child development	Integration of cultural and industrial values, promoting the shift from <i>static preservation</i> to <i>living inheritance</i>
Key Practices	Cross-disciplinary collaboration (education, arts, etc.) to deepen aesthetic education	Promoting local creative industries through experiential activities, balancing cultural and economic benefits
Target Audience	Children	General visitors (including families and tourists)

Through the comparison of the two museums, it can be found that aesthetic education for urban and rural children shows differences in psychological development, social interaction, creativity cultivation, and cultural identity. The disparities in children's development caused by the imbalance of urban-rural development are not limited to the field of aesthetic education [15]. From the perspective of children's overall development [16], psychological development, social interaction, creativity cultivation, and cultural identity are all profoundly influenced by regional differences, and together with aesthetic education constitute key factors affecting children's developmental trajectories.

(1) Spatial Experience

Urban and rural children exhibit structural differences in their aesthetic processes of spatial experience: many urban spaces feature multifunctional facilities, communication and exhibition platforms, and the embedding of local culture in the environment, allowing children's perception, understanding, and creativity to develop in multiple dimensions. In contrast, rural areas lack social support and operational models, so children's exploration remains largely perceptual, without deeper channels for understanding and expression.

(2) Psychological Development

In terms of psychological development, the differences in aesthetic education between urban and rural children directly affect their mental growth. Urban children can access beauty through museums and art exhibitions, stimulating perception and emotional experience, and are better able to understand and express emotions in art education, forming positive self-recognition. Rural children, however, due to the scarcity of aesthetic education resources and insufficient aesthetic experiences, are more likely to experience emotional and psychological challenges, such as inferiority or self-doubt.

(3) Social Interaction

Aesthetic education is not only an individual experience but also carries social interaction functions. Urban children, with abundant access to artistic activities, can develop cooperation, communication, and other social abilities through collective participation, thereby improving social adaptability. In contrast, rural children, constrained by limited aesthetic resources and single social environments, have less developed social skills, affecting their ability to adapt to broader social interactions.

(4) Creativity Cultivation

Aesthetic education is an important driving force for creativity. Urban children can cultivate innovative thinking and problem-solving skills through various creative forms such as painting and music. Rural children, due to the lack of aesthetic education resources and opportunities for creative expression, may be disadvantaged in terms of thinking and innovation, limiting their future development.

(5) Cultural Identity

At the level of cultural identity, the influence of aesthetic education also differs between urban and rural contexts. Urban children, exposed to diverse cultural environments, can more easily develop open cultural perspectives. Conversely, rural children's horizons are more limited by local culture, possibly forming relatively single cognitive frameworks, which may affect their cross-cultural adaptability [17].

2.3. The Uniqueness of Museums as Spaces for Children's Aesthetic Education

Compared with traditional museums, the uniqueness of children's museums lies in their systematic construction of "play" as the core mechanism of the learning process, forming an experience-driven educational environment. This uniqueness is not only reflected in the tactile and operable features of exhibits but also in the high level of integration between spatial planning, activity content, and educational objectives. In such spaces, children are no longer passive viewers but actively construct their understanding of abstract concepts through *bodily participation* [18] and *instant feedback* [19]. Therefore, the uniqueness of children's museums lies in their dual role as both places of scientific enlightenment and classrooms for aesthetic education. By integrating the cultivation pathway of

“perceiving beauty—creating beauty—expressing beauty” into exhibitions and activities, they provide children with an immersive aesthetic education experience that other educational spaces cannot replace, truly becoming distinctive cultural spaces that promote aesthetic growth and holistic personality development [20].

3. Research on the “Triadic Synergy” Model and Differentiated Design Path of Urban–Rural Children’s Museums Under the Guidance of Aesthetic Education

3.1. Construction of the “Space–Function–Aesthetic Education” Triadic Synergy Model

According to existing research, the design of children’s museums needs to comprehensively consider perspectives such as spatial perception, functional adaptation, and aesthetic experience, including spatial experience, functional needs, emotional evaluation, children’s perception of the environment [21], behavioral demands, and aesthetic preferences. Previous designs often started from functional and aesthetic perspectives, neglecting the interactive mechanisms among these dimensions. As a spatial carrier balancing educational and public attributes, children’s museums require a more integrated and education-oriented design perspective. Therefore, this study proposes the “Space–Function–Aesthetic Education” Triadic Synergy Model (Figure 1).

Space, as the physical basis for children’s perception and behavior, determines whether functionality can make the space *usable*, directly influencing children’s exploratory and social behaviors. Aesthetic education is the core goal of children’s internal growth and an important manifestation of the educational value embodied in space.

The aesthetic education model based on space assumes that aesthetic education is a path for cultivating human spiritual rationality. Among these, the spatial dimension, as the foundation of children’s perception and behavior [22], can be understood through the *Stimulus–Organism–Response (S–O–R)* model [23] in environmental psychology: spatial elements as stimuli (Stimulus) act on children’s sensory and cognitive systems (Organism), thereby triggering exploratory, interactive, and social behaviors (Response). This perspective emphasizes that space is not merely a background for behavior but directly influences children’s psychological and behavioral responses through perceptual stimuli [24], providing the basic conditions for aesthetic experience. The functional dimension focuses on the adaptation and balance of diverse needs such as education, communication, and entertainment, emphasizing environmental usability and behavioral support; the aesthetic education dimension highlights the value orientation of children’s growth [25], emphasizing the cultivation of aesthetic perception, cultural understanding, and creative expression. These three dimensions do not exist in isolation but interact with each other to jointly promote children’s aesthetic experience and personality development within space.

Furthermore, this study concretizes the aesthetic education dimension into a *three-level pathway of “Perception–Understanding–Creation”*: at the *perceptual* level, color, light, and form trigger intuitive aesthetic experiences; at the *understanding* level, cultural narratives and exhibition logic guide deeper cognition; at the *creative* level, interactive installations and autonomous practice encourage individuals to produce personalized expressions and works [26]. This progressive pathway reveals the dynamic process of children’s aesthetic growth realized within museum spaces.

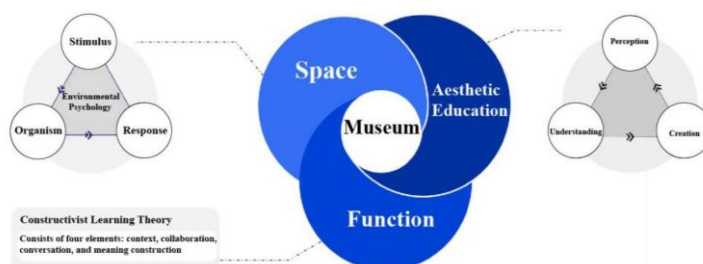


Figure 1. Diagram of the “Space–Function–Aesthetic Education” Triadic Synergy Model

Table 2. Spatial–Functional–Aesthetic Integration Across Museum Zones

Zone	Spatial Layout and Design	Functional Realization and Cognitive Support	Aesthetic Integration and Experience Enhancement
Overall Layout Structure	“Ring + Node Reinforcement” pathway; seven themed exhibition areas arranged sequentially, forming a progressive structure of “Perception Initiation → Cognitive Transformation → Creative Output.”	Builds a clear cognitive development chain; lighting and material choices serve as systematic cognitive mediators.	Through coherent circulation and embedded cultural symbols, guides children toward a holistic understanding of “beauty,” strengthening cultural identity and aesthetic growth.
Nature Exploration	Simulated natural scenes and biological specimens; low-illuminance warm yellow light (3000–4000K, 100–200 LUX) with diffused lighting, weakening physical boundaries.	Reduces environmental pressure for children, stimulates curiosity, and broadens visual perception.	Through natural materials (wood/stone) and multimodal sensory linkage, concretizes natural experiences and enhances immersion and intuitive aesthetic perception.
Art Gallery	Neutral self-light (4000–4500K) combined with directional spotlights to create visual anchors.	Directs attention focus and optimizes interpretation of artistic elements; micro-perforated acoustic walls and linen art walls improve auditory and visual comfort.	Combines artistic forms with cultural symbols to help children understand aesthetic principles and cultural values in art.
Inspiration World	Lighting design coordinated with interactive installations to create playful hotspots.	Stimulates associative thinking and gamified learning; erasable resin walls visualize children’s thought processes.	Encourages children to discover and express beauty through interaction, cultivating creativity and aesthetic expression.
Cultural Sanctuary	Warm yellow directional light (2700–3500K, 80–150 LUX) forms a tunnel effect, compressing visual width to 1.2 m.	Enhances immersive historical narratives and facilitates cognitive internalization; aged copper display cases and coarse pottery replicas evoke cultural associations.	Uses materiality and lighting to create a deep narrative atmosphere, strengthening sensitivity and identity toward traditional aesthetics and historical culture.
Science Laboratory	Cool neutral light (5000 K, 300–500 LUX) with high-uniformity illumination and reflective metal surfaces, expanding the visual field to support group cooperation.	Encourages hands-on experimentation, transforming understanding into skills; corrosion-resistant lab benches and metal equipment enhance scientific cognition.	Provides experience of the beauty of science in a rational, bright environment, cultivating logical thinking and creative confidence.
Reading Staircase	Low-illuminance warm lighting (<150 LUX) creates a tranquil atmosphere.	Promotes knowledge absorption and individualized learning, serving as a rhythm-adjusting node in cognitive processes.	Through lighting and material tactility, establishes a private ambiance that guides children to internalize beauty and knowledge through quiet reflection.
Inspiration Space	Warm-white gradient light strips and pale blue walls with convergent lighting channels (<150 LUX).	Guides children to transform internalized knowledge into personalized expression and creative output.	Lighting color transitions stimulate creative expression and enhance subjective reconstruction of beauty.
Cultural & Creative Store	Even neutral lighting softens boundaries, forming a behavioral reset node.	Completes the dual-loop path of “Physical Route–Lighting Channel,” guiding behavioral transition from structured interaction to free social engagement.	Through cultural products and lighting atmosphere, extends the aesthetic education experience, promoting the lifestyle integration and socialization of beauty.

3.2. Developing Diversified Aesthetic Education Design Paths and Value Orientation Based on Urban–Rural Differences Among Children

Diversified activities in urban areas are generally abundant: well-equipped schools, a wide array of extracurricular programs, and high parental investment in education all contribute to providing urban children [27] with more opportunities for learning and development. This is reflected in their stronger performance in knowledge acquisition, social competence, and overall quality. However, the significant gap between urban and rural children cannot be ignored. Rural children face relatively limited access to educational resources, healthcare, and living conditions. In many rural areas, outdated school facilities and weak teaching capacity restrict children's learning conditions and opportunities. Furthermore, as urbanization accelerates, many rural parents migrate for work, leading to a growing number of *left-behind children*. These children often lack parental care and companionship during their formative years, resulting in increasing concerns about their mental health [28].

Urban and rural children also face distinct challenges in cultural and value formation. Urban children grow up in multicultural environments [29], enjoy broader horizons, and can adapt more readily to rapid social change. Yet, they often bear greater psychological stress under intense competition. In contrast, although rural children lead simpler lives, they are often constrained by traditional beliefs, with limited exposure to and understanding of new ideas.

To address the imbalance in development between urban and rural children, it is necessary to promote the equitable distribution of educational resources and strengthen the integration of urban and rural education. At the same time, increasing attention should be paid to the mental health and family support of rural children, helping them to build self-confidence and improve social adaptability.

4. User Feedback Research and Analysis

4.1. Design Logic of Questionnaire and Interviews

This study adopts a *mixed-methods research design*, combining structured questionnaires with semi-structured interviews to collect data. The questionnaire design is based on the classical *Kano Model* [30], constructed using its distinctive *dual-question format*. The questionnaire focuses on visitors' experiential feedback regarding urban and rural children's museums, targeting core groups such as children and accompanying parents, while also incorporating perspectives from educators.

The specific dimensions investigated in the questionnaire include:

Spatial design and circulation guidance (functional perception);

Visual aesthetics and lighting environment (aesthetic experience);

Interaction modes and creative modules (engagement and initiative);

Materials and cultural elements (perceptibility and regional expression).

Through this instrument, the study aims to systematically gather information on visitor perceptions and needs across these key dimensions.

Online surveys, due to their broad reach and efficiency, were prioritized for initial data collection, with 150 questionnaires distributed and 135 returned. However, since online responses may be affected by generational comprehension bias and cannot fully reflect children's authentic experiences, offline surveys were emphasized. Conducted in specific settings and guided by professionals, the offline questionnaires and interactive interviews enabled children's direct participation, providing contextually grounded, real-time feedback that accurately captured their reactions and interests during the "*perception–understanding–creation*" process. In total, 100 offline surveys were completed, with 92 valid responses.

Altogether, 250 questionnaires and interviews were administered, achieving an overall completion rate of 90.80% (227 total). After eliminating 27 invalid responses, 200 valid datasets were retained for analysis.

Overall, the gender distribution among surveyed children was balanced, covering the 6–12 age range. The offline sample mainly consisted of children visiting the museum and students from partner schools. Their guardians (both online respondents and accompanying adults) came from diverse backgrounds, including parents and teachers with different educational levels. A significant portion of children were either first-time or repeat visitors to children’s museums, showing widespread interest in interactivity and experiential learning. Statistical analysis [31] of the questionnaire data based on the three dimensions—*perception, understanding, and creation*—revealed strong structural validity, with internal consistency reliability coefficients and exploratory factor analysis results exceeding 0.75 for key indicators such as *interest, clarity, and inspiration*. This demonstrates that the measurement tools reliably reflect the quality of children’s experiences in museum environments and the stimulation of their creative potential. By combining direct observation, interactive interviews, and structured questionnaires, the collected data encompass both the evaluative perspectives of guardians and the immediate, situational responses of children themselves. This approach effectively captures children’s authentic reactions, focal interests, and creative expressions within the museum context, illustrating their “*perception–understanding–creation*” developmental process and underlying needs under real interactive and environmental conditions.

4.2. Data Analysis and KANO Classification

Table 3. Summary of KANO Model Analysis Results

Function / Service	A	O	M	I	R	Q	Classification Result	Better	Worse
Completeness of public facilities & lack of public facilities	37.23%	14.89%	14.89%	25.53%	3.19%	4.26%	Attractive Attribute (A)	56.32%	-32.18%
Site adaptability & lack of site adaptability	47.87%	13.83%	7.45%	28.72%	1.06%	1.06%	Attractive Attribute (A)	63.04%	-21.74%
Innovative interactive elements & absence of multisensory interaction	27.66%	36.17%	18.09%	18.09%	0.00%	0.00%	Performance Attribute (O)	63.83%	-54.26%
Multisensory interaction & absence of innovative interaction	57.45%	24.47%	4.26%	12.77%	1.06%	0.00%	Attractive Attribute (A)	82.80%	-29.03%
Environmental cleanliness and aesthetics & poor environmental hygiene	32.98%	39.36%	4.26%	23.40%	0.00%	0.00%	Performance Attribute (O)	72.34%	-43.62%
Comfort of experience & discomfort of experience	20.21%	40.43%	25.53%	13.83%	0.00%	0.00%	Performance Attribute (O)	60.64%	-65.96%
Optimized environmental design & non-optimized environmental design	20.21%	19.15%	35.11%	25.53%	0.00%	0.00%	Must-be Attribute (M)	39.36%	-54.26%
Guided service available & no guided service	41.49%	7.45%	0.00%	43.62%	1.06%	6.38%	Indifferent Attribute (I)	52.87%	-8.05%

Note: A = Attractive Attribute, O = Performance (One-dimensional) Attribute, M = Must-be Attribute,

I = Indifferent Attribute, R = Reverse Attribute, Q = Questionable Attribute.

Based on the statistical combination of positive and negative questionnaire items, user satisfaction responses toward each design element were classified into six categories—Attractive, Performance, Must-be, Indifferent, Reverse, and Questionable attributes (see Table 1).

Basic frequency statistics were performed using SPSS, and cross-analysis was conducted between classification results and respondents’ demographic characteristics to explore differences in aesthetic design preferences among user groups.

Preliminary results show that children tend to classify interactive installations and multimedia exhibits as Attractive Attributes, reflecting their preference for participatory and sensory-rich experiences; meanwhile, 20.21% of respondents emphasized the importance of clear circulation routes, categorizing them as Must-be Attributes essential to spatial usability and comfort.

5. Aesthetic-Education-Oriented Design Practice for Urban–Rural Children’s Museums

5.1. Diversified Aesthetic Education Design Paths

According to the conclusions drawn from the Kano model analysis, and based on the differences observed between urban and rural children’s museums in spatial experience, psychological development, creativity cultivation, and cultural identity, this study constructs a full-chain aesthetic education design path through the “Space–Function–Aesthetic Education” framework. This approach realizes the aesthetic progression of “Perception–Understanding–Creation”, establishing diversified design strategies and value orientations tailored to different child groups. Sensory experience serves to stimulate curiosity and exploratory motivation; exhibition narratives and educational guidance deepen cultural and aesthetic understanding; and open creative practices foster individualized expression and creative development. The application of the Triadic Synergy Model enables the coordination and integration of spatial layout, functional needs, and aesthetic education goals, providing a systematic design path [32] for children’s museums. Moreover, it offers theoretical support for achieving diversified aesthetic education objectives and establishing clear value positioning.

5.1.1. Design Practice

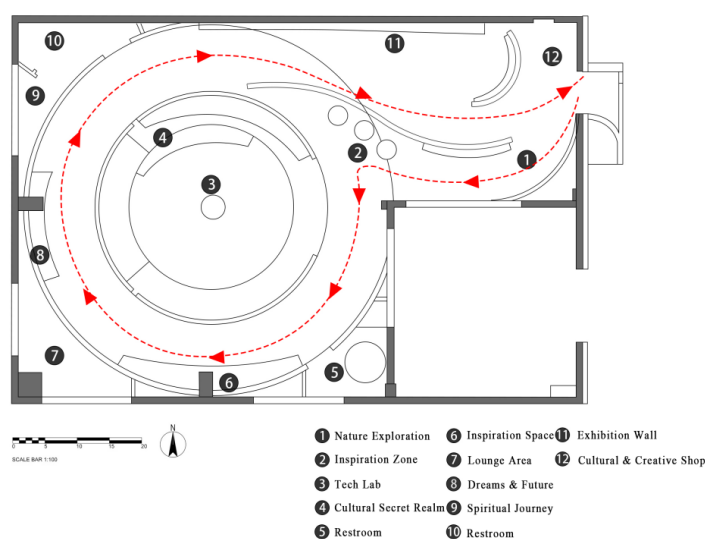


Figure 2. Floor Plan of the Rural Children’s Museum

As shown in the figure, the overall visiting route of the children’s museum adopts a “ring + node reinforcement” layout, with seven themed exhibition zones unfolding sequentially [33], forming a cognitive progression structure from *perception* to *understanding* and finally to *creation*. The tour begins at the waiting area and first enters the Nature Exploration Zone, which uses simulated natural

scenes and displays of animal and plant specimens to construct an immersive natural perception experience for children, serving as a typical “*perception activation area*.” Due to its vivid exhibits and rich information, this area often becomes the first gathering node, stimulating children’s curiosity and observational interest. Advancing along the main route, children successively enter the Art Gallery, Inspiration World, and Cultural Sanctuary. Among them, *Inspiration World*, featuring innovative interactive installations and visual stimuli, builds upon the sensory experience of the previous section and extends it toward higher levels of comprehension and association. Here, children can grasp abstract concepts through gamified interactions. With its engaging and participatory exhibits, this area forms a distinct hotspot for pausing and interaction.

In the latter half of the exhibition route, the Science Laboratory, as a typical “*hands-on practice area*,” further immerses children in experiential learning contexts. Through opportunities for scientific experiments and actual equipment operation [34], children transform their understanding into practical knowledge, extending the cognitive path’s depth. As practice activities require a certain amount of time and space, this section constitutes a *retentive spatial phase*, where children tend to gather for longer periods. The Reading Staircase provides a quiet, immersive space for reflection, facilitating deeper knowledge internalization. At the end of the route, the Inspiration Space, with its artistic display approach, emphasizes openness and creativity, guiding children to transform what they have learned into personalized expression, thereby completing the “*creative output*” cognitive loop. The Cultural and Creative Store serves as the terminal point of the route, not only forming a physical closure of the circulation path but also offering a commemorative space for selection and memory.

Overall, the museum’s spatial circulation embodies a path logic centered on “*cognitive progression + interest focus*,” effectively compensating for weaknesses in creativity cultivation within urban–rural children’s museums. Key nodes are strengthened through engaging content and participatory mechanisms, while their functional layout facilitates transitions in children’s attention and cognitive leaps.

5.2. Using Light and Materials to Regulate and Enhance Children’s Perception and Exploration of “Beauty”

In terms of lighting and materials, the entrance employs low-illuminance warm lighting to create a safe and immersive perceptual atmosphere. The Art Gallery and Cultural Sanctuary use neutral white light for focus and warm yellow light to enhance historical immersion, thereby deepening understanding. In the creative zones, high-illuminance cool white lighting stimulates collaborative experimentation, while soft light strips at the end of the route guide creative expression. Along the circular pathway, materials such as *wood*, *acoustic panels*, *erasable resin walls*, and *aged copper plates* respectively reinforce the immersive, interactive, and associative experiences of each zone, collectively forming a physical environment that drives deep learning. To a certain extent, these design strategies compensate for limitations in *emotional expression*, *self-awareness*, and *understanding development* observed among urban and rural children.



Figure 3 Design Renderings of Urban-Rural Children's Museum

5.3. Strengthening Cultural Embedding in Pathways and Materials to Enhance the “Perceptibility” of Aesthetic Education Content

The pathway configuration and material selection of urban–rural children’s museums possess both spatial-aesthetic and cultural-educational attributes. Through systematic design, these elements can effectively enhance the *perceptibility* of aesthetic education content, helping children deepen their understanding of beauty.



Figure 4. Design Renderings of Urban-Rural Children's Museum

Pathways should be centered on *cultural connotation*, using narrative storytelling and the embedding of cultural symbols (for example, “cultural theme routes” complemented with local art exhibits and informational panels) to guide children’s active exploration and achieve a subtle cultural immersion during the visit.

Material selection should balance *cultural symbolism* and *tactile experience*, prioritizing traditional local materials such as ceramics and wood. These ensure visual appeal while reinforcing interactive tactility, encouraging children to deepen their aesthetic cognition through touch-based perception [35].

In addition, museum exhibits, installations, and interactive zones should integrate *multicultural elements* encompassing both traditional and modern art forms, thereby fostering diverse aesthetic competencies in children. In conclusion, embedding cultural content into pathways and materials can significantly enhance the aesthetic education function of museums, providing children with a comprehensive platform for sensory experience and cultural cognition—ultimately contributing to their holistic development.

5.4. Applying Creative Educational Modules to Guide Children’s Transformation from “Observers” to “Creators”

In the context of integrated urban–rural development, the core function of children’s aesthetic education museums is shifting from traditional exhibition to the cultivation of aesthetic literacy and creativity. To facilitate children’s transition from “*observers*” to “*creators*,” the museum systematically embeds creative educational modules. These modules are centered on children’s cognitive and aesthetic experiences, constructing an educational chain of “*perception–exploration–expression–co-creation*.” They provide immersive and interactive creative platforms. For example, through dynamic exhibition zones, modular toolkits, and interdisciplinary art forms, children are guided to engage in individual or group creations, transforming their urban–rural cultural experiences into artistic works. Thus, the museum becomes an “aesthetic laboratory” that inspires creativity and confidence, encouraging children to actively construct artistic meaning [31]. This promotes balanced and high-quality development in aesthetic education.

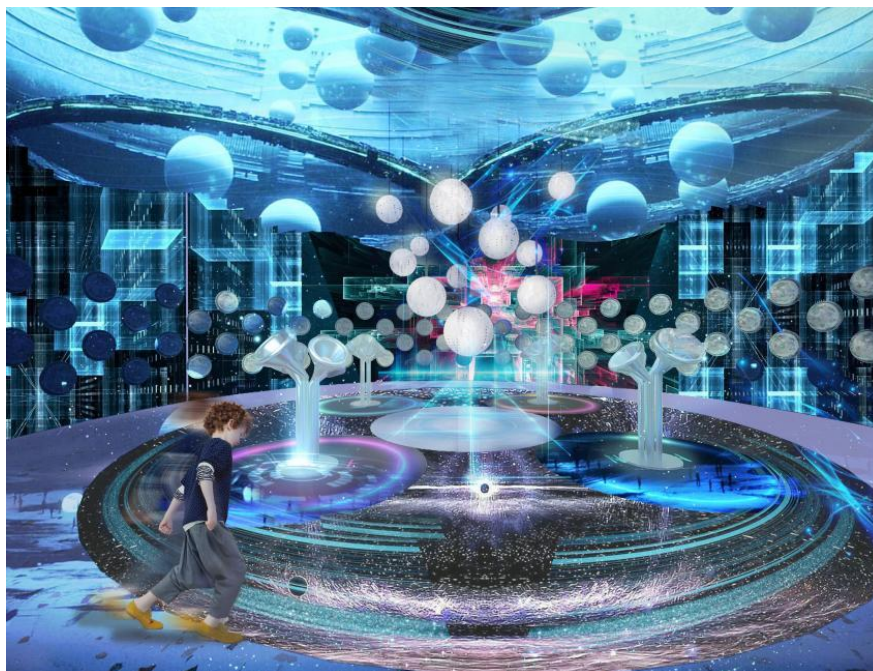


Figure 5. Design Renderings of Urban-Rural Children's Museum

5.5. Promoting the Construction of Aesthetic Identity Through Urban–Rural Social Participation Mechanisms

The promotion of aesthetic identity through urban–rural social participation mechanisms is reflected in two main dimensions. First, in terms of *participants*, the museum gathers artists, artisans, and volunteers to form interdisciplinary mentoring teams. Through collaborative activities such as *urban–rural co-creation workshops*, children experience the *usefulness* and *warmth* of aesthetic education through cooperation and shared creativity. Second, in terms of *resource integration*, the museum establishes “*museum–community linkage*” immersive settings, guiding children to observe and experience within authentic urban–rural contexts while contributing their creative outcomes to community exhibitions. When children witness their artistic practices contributing to community culture, the resulting *sense of achievement and belonging* becomes the emotional core of aesthetic identity formation.

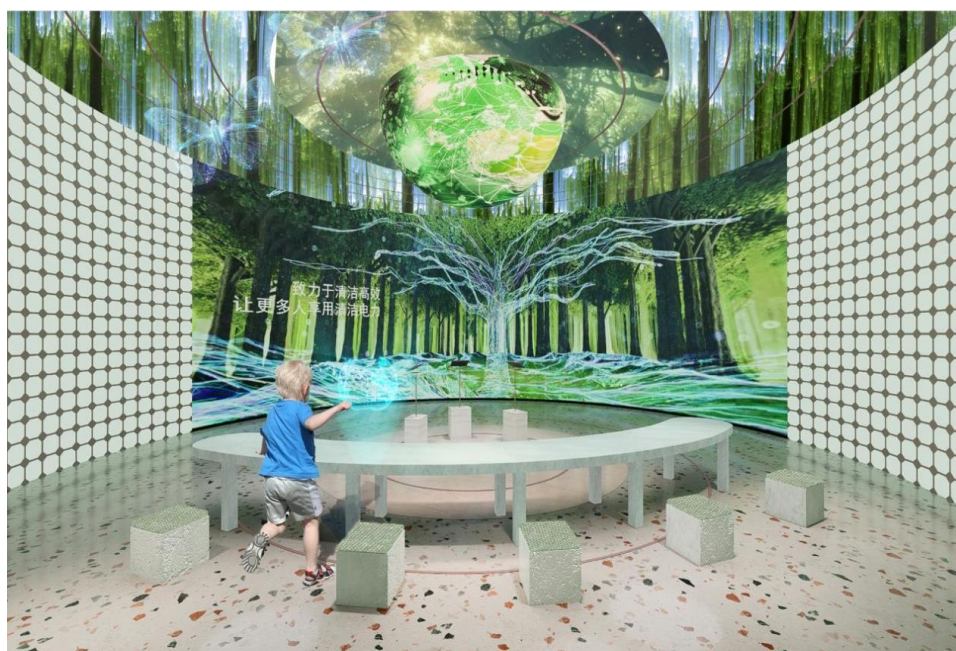


Figure 6. Design Renderings of Urban-Rural Children's Museum

6. Conclusion

Based on the analysis of urban–rural differences in children’s museums, this study employs the Kano model to quantitatively examine children’s aesthetic education environments. Guided by aesthetic education, it proposes an “Aesthetic Education–Space–Function” Triadic Integration Model as a design pathway for urban–rural children’s museums. By systematically integrating the three dimensions of *aesthetic education objectives*, *spatial experience*, and *functional cognition*, the study establishes a unified design strategy that positions aesthetic goals as the guiding principle, spatial layout as the medium, and functional realization as the foundation. Through design practice and model validation, it enables children to deepen aesthetic perception and logical cognition through the progressive experience of “*Perception–Understanding–Creation*.” Ultimately, this framework enhances children’s comprehensive literacy and provides both theoretical references and practical paradigms for the design and transformation of aesthetic education spaces for urban and rural children.

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