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# Principles of forming an innovative architectural and planning structure for preschool institutions

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## Abstract:

The article is devoted to the study of foreign experience in designing innovative-type preschool institutions for children. The analysis of design solutions has allowed us to identify the main principles of architectural and planning structure of preschool institutions, taking into account climatic, geophysical and national characteristics of the region: providing multifunctional educational process, transformation of space, mobility, inclusiveness, architectural expressiveness, integration with the landscape, implementation of the principles of sustainable architecture. The established principles can contribute to the creation of innovative types of educational preschool institutions capable of meeting the needs of modern society in the Republic of Uzbekistan.

## Keywords:

preschool institution, architectural and planning structure, planning modules, space transformation, kindergarten architecture, educational environment

## 1. Introduction

A characteristic feature of modern society is the activation of innovative processes in education, including preschool education. Teaching standards and methods are changing, and components of the educational process are being updated to ensure its mobility, flexibility, and variability. Moreover, the rapid development of information technologies, the need to create an atmosphere of creativity, and the trend towards child-centered education require special organization of the architectural and planning space of preschool institutions. As a result, existing standard designs for nurseries and kindergartens do not meet the demands of the times, and architects and designers face the challenge of developing new conceptual approaches to the design of preschool buildings. In foreign countries, considerable work is being done to expand the typology of preschool buildings, demonstrating a variety of approaches to their design and an effort to align them with the concept of modern preschool education development [1, 2, 3, 4]. Therefore, studying and borrowing foreign experience may help create a domestic innovative architectural and planning structure for preschool institutions that takes into account the climatic, geophysical, and national characteristics of the region.



The Kaleidoscope Kindergarten in Tian Shui (China, 2020) is notable for its planning, which includes a three-

## 2. Results and discussion

### 2.1. Foreign Experience in Designing Preschool Institutions

To establish modern trends in improving the architectural and planning structure of preschool institutions, recent projects of such buildings were studied. It should be noted that all of these buildings implemented common principles, such as considering child psychology, creating environments that develop children's intellectual, physical, and creative abilities, using environmentally friendly materials, applying unconventional energy sources, creating bright and unusual architectural forms, and adapting to the surrounding landscape. However, the primary interest for our research was focused on objects with new functional and planning solutions for preschool buildings.


For example, the kindergarten in Vinh (Vietnam, 2019) can be characterized as a developing, safe, and sustainable facility (Fig. 1) [5]. In addition to the standard set of rooms, this kindergarten features new functional spaces, such as a sports center with a swimming pool, art classrooms, a media center, and open recreation areas that are oriented towards active learning and interaction with the surrounding natural environment.



Fig. 1. The kindergarten in Vinh, Vietnam [5]

story multifunctional atrium that can be used depending on the events being held (Fig. 2).

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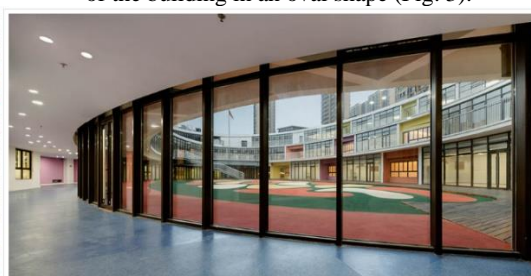




**Fig. 2. Interior with atrium of a kindergarten in Tianshui, China [5]**

In the kindergarten building in Wuxi (China, 2014), one of the main principles is ensuring the safety of children in the midst of multi-story buildings and intensive traffic on

nearby streets. This is achieved by creating an inner courtyard for children's walks and play, located at the center of the building in an oval shape (Fig. 3).



**Fig. 3. Kindergarten building in Wuxi, China [5]**

The method of internal transforming spaces is implemented in the innovative kindergarten in Stupino (Russia, 2023) (Fig. 4). Here, the technology of transforming

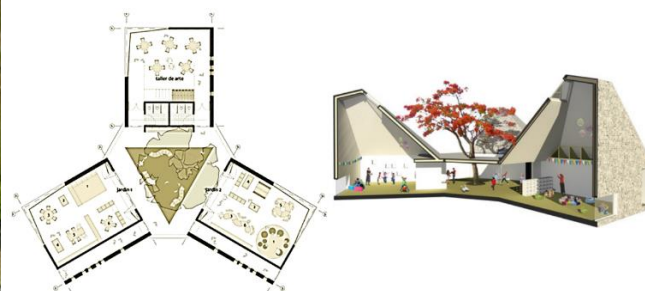
partitions allows the expansion of play areas or, conversely, the partitioning of a small part of the room for educational activities [6].



**Fig. 4. Kindergarten in Stupino (Russia)**

The Timayui preschool in Santa Marta (Colombia, 2011) was designed based on a universal modular system (Fig. 5) [7]. Each module consists of three rectangular blocks: two contain group rooms, and the third is a multifunctional open

room with sanitary facilities, connected by a recreational area. The modules are linked by galleries and can be adapted for other purposes, such as kitchens, dining rooms, and service areas.



**Fig. 5. Timayui kindergarten in Santa Marta, Colombia [7]**

This modular structure allows the building to have flexible planning and the potential for "growth" (adding more modules) if needed due to functional requirements or increased capacity.

The analysis of modern foreign preschool buildings has allowed us to identify key principles for forming an

innovative architectural and planning structure for these institutions, which have been further adapted to the climatic, geophysical, and national characteristics of Uzbekistan.



## 2.2. Principles of Forming the Architectural and Planning Structure of Innovative Preschool Institutions for the Republic of Uzbekistan

### 1. Ensuring the Multifunctionality of the Educational Process.

The modern preschool education system is highly dynamic, responding to the needs of society and individuals. It must guarantee a high level of education necessary for a child's comprehensive development and successful socialization, as well as the development of skills such as curiosity, creativity, and communication. Therefore, the structure of preschool institutions should include an increased number of rooms for educational, creative, cognitive, research, play, and sports purposes: media centers, libraries, museums, exhibitions, art workshops, music and dance classes, playrooms, sensory and cognitive development centers, recreational spaces, swimming pools, physical education halls, etc.

Spaces for cognitive research activities, defined by short-term sessions, can also be used by children who live in the area but do not attend the preschool regularly.

### 2. Transformation of Space

The emergence of various functional and spatial areas within preschool institutions requires rational use of space, minimizing underutilized corridors and passageways. One of the ways to achieve this is by implementing transforming partitions, which allow large spaces to be divided into smaller zones or, conversely, combine small rooms into one large space.

For example, group rooms in modern preschools should be flexible and adapted to changing ecosystem conditions. The classic zoning scheme, based on isolating rooms (cloakroom, group room, bedroom, bathroom), no longer meets these requirements. Transforming partitions can be used to include additional spaces such as recreation areas and corridors into the required zone.

Another example could be the transformation of adjacent halls for physical and music classes, separated by a transforming partition, which can be combined if needed for mass events. Additionally, if there are rooms such as a dance hall or storage rooms next to these halls, transforming partitions can create additional space for temporary seating during holidays or sports events.

### 3. Mobility

A preschool building should be able to change in line with the rapid development of innovative pedagogical technologies, improvements in teaching methods, and societal needs. The most convenient spatial structure is modular, allowing for gradual expansion and transformation of the building. However, the territory of the preschool institution should also have corresponding reserves.

### 4. Inclusivity

Preschools should integrate children with disabilities, creating conditions for the successful learning and development of every child. Buildings should ensure comfortable movement through ramps, elevators, and wide, accessible corridors.

### 5. Architectural Expressiveness

The architecture of a preschool building should reflect the spiritual and emotional world of children, as well as the

natural and national characteristics of the region. The facade should be enriched with details that convey positive and educational messages, which can be expressed through the use of "smart surfaces" that react to human actions and large glazed areas. The aesthetic quality of the building can be enhanced by using colored, tinted glass in communication zones (corridors, staircases, vestibules).

### 6. Integration with the Landscape

To promote ecological education and harmonize with the surrounding environment, the building should include winter gardens and recreation areas with large glass surfaces, primarily oriented toward the southern horizon. Another approach, particularly useful in densely built urban areas, is to create an open playground with grass on the roof of the preschool. Natural landscape elements (biozones, barriers for regulating air flow) should be used to create a favorable microclimate for the area.

### 7. Implementation of Sustainable Architecture Principles

Preschools should be designed to be durable, seismic-resistant, and long-lasting. To allow for changes in planning structures based on evolving societal demands, a frame construction system is most suitable.

Preschools should also be energy-efficient buildings, using eco-friendly construction materials that are low-energy in production. To maintain a comfortable microclimate, renewable energy sources (solar panels, heat pumps, wind turbines, etc.) should be incorporated, depending on their efficiency in the given climate zone [8]. Solar shading devices, reflective materials, and "horizontal" and "vertical" greenery elements can protect the building from excessive solar radiation during hot periods.

## 3. Conclusion

The basic principles of formation of architectural and planning structure of children's preschool institutions established on the basis of foreign experience can contribute to the expansion of the typology of buildings of this purpose, to orient their volume-planning solution to meet the rapidly developing innovative processes in preschool education and to ensure the formation of children's modern outlook and their socio-cultural adaptation.

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