

Analysis and design of child-friendly play Spaces

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Abstract. Since quality education has become an important policy concept of contemporary education reform and development in China in the 21st century, as the country has proposed and planned the concept of child-friendly cities and communities, the combination of developing future child-friendly communities and quality education outside school has become an inevitable trend of the development of The Times. Modern urban society should provide space for children's entertainment and the educational significance of games. This study analyzes the advantages and disadvantages of relevant cases from the aspects of artistic techniques used and ideas conveyed, as well as the selection and consideration of amusement facilities, and thinks about how to improve and innovate. It provides ideas and schemes for how to design a child-friendly play space with both beautiful and entertaining functions. This paper mainly provides ideas for the design of hardware facilities and software facilities of child-friendly play space, through the analysis of children's physiological and psychological characteristics and needs, combined with traditional Chinese culture, to provide ideas for the design of child-friendly play space.

Keywords: Kid-friendly; play space; abstract art; Chinese traditional culture.

1. Introduction

Play is the way children learn about the world, the world they live in, and the mission to transform it. In the process of rapid urbanization, our country is actively promoting the construction of child-friendly cities. Although contemporary science and technology are more and more developed, science and technology wrap the development of the whole society, but children's right to play is subject to many restrictions, children's play facilities are more and more mechanized and immobilized, lost the opportunity to close contact with nature, replaced by fixed mechanized game mode, as well as a variety of electronic products. The fast-food entertainment brought by electronic products can easily distract children's attention and let children who are not good at self-control indulge in it.

To meet the needs of children for play activities, how to create a child-friendly play space for children to learn and understand the world is a problem that needs to be faced today.

2. Artistry and Functionality

2.1. Artistic Technique

Urban public activity space plays an important role in the formation of urban functions and image, carrying the interaction between citizens' communication and leisure and the city, and children's public play space is indispensable in the formation of urban public activity space. Childhood education is one of the things that have a lasting impact on people. One of the most important cognitive pathways in the development of children is "play". Children's public amusement facilities provide "play" conditions for children growing up in the urban environment. It needs to consider the psychological and physiological development characteristics of children, conform to the growth law of children's environmental perception and learning, ensure the safety of children while ensuring their entertainment experience, and play a role in education and guidance for children's perception of the environment, experience of society, personality cultivation, value creation and other aspects [1]. Children's play space in the public area has the role of guiding children's aesthetic and perceptual ability, helping children to connect their familiar things with the unknown in the process of growth, learning, and understanding the world.

2.1.1. Abstract geometric art

The use of simple geometric shapes to summarize the complex features of things in the construction of entertainment facilities can guide children to understand the basic symbolic language. In early childhood, children can only understand the rough geometric structure of the things they observe and do not have enough theoretical knowledge to assist cognition. Graffiti was created by children when they were new to painting, and fresco works in prehistoric times were easier for children to learn cognitively - the first abstract paintings of mankind. In the Paleolithic Age, the stone tools used by humans were uniform and regular, many ornaments were polished, drilled, and carved, and "the clothes were dyed with hematite." Aesthetics and art, hidden under the content of practical utility, have gradually acquired social symbolic significance. In the painted pottery period, human beings began to create geometric abstract patterns, although they did not realize that it was abstract art, they completed the creation in their talent. Xu Demin's Theory of Abstract Art and Culture holds that "aesthetics precedes thoughts and concepts", "human's instinct precedes social aesthetics", and "abstract aesthetics is human's natural talent". Even if there is no rational logical thinking, beauty and meaning in pure abstract visual forms can be felt only through human intuition, Epiphany, instinct, and other spiritual factors. Therefore, even though children's thinking and cognition have not been developed and perfected, they have no impact on children's perception of the formal beauty of abstract art [2].

Integrating common abstract geometric symbol language into the play space will facilitate children to better explore and understand the world. For example, the Yunhaisen Nature Exploration Park, located in Fuzhou, China, uses simple geometric symbols such as a giant half-sphere with holloway and a curved slender cylinder to show the form of jellyfish, which not only provides entertainment function but also exercises children's association ability. The characteristics of some common elements distilled by definitions are illustrated in Table 1.

Table 1. Common Element.

Number	Element	Definition	Feature	Geometric image
1	Sun	The central object of the solar system is the star at the center of the solar system	A large sphere that is visible during the day and provides heat and light	
2	Moon	A spherical body that orbits the Earth and is the Earth's only natural satellite	Visible at night, and medium in size, spheroids whose shape changes over time are visible	
3	Starshine	The celestial body visible to the naked eye in the universe	Small, luminous dots visible at night	

2.1.2. Chinese Traditional Art

Culture, as a complex, contains all the knowledge, beliefs, arts, morals, laws, and customs of a certain nation and a certain region, as well as people's talents and habits in society [3]. Since the reform and opening up and the development of globalization, the world's civilizations have increasingly converged to learn from each other. As an ancient civilization with a long history, China's national culture includes not only material heritage but also rich ideas, philosophy, art, and moral concepts. As a unique art of painting expression in China, traditional Chinese painting has carried on linear generalization and subjective deformation of things and is a brilliant crystallization of Chinese culture.

Children's public play space plays an important role in children's cultural education and aesthetic training and will have the interpretation of traditional Chinese style cultural significance in the current era, which is conducive to children's aesthetic education and the development of traditional culture. The symbolic meanings of some common elements derived from features are shown in Table 2.

Table 2. Common Element.

Number	Element	Feature	Symbolize
1	Cloud	Water evaporates into steam and condenses in the air	Vitality, spirituality, spirit and auspiciousness
2	Water	Vitality, spirituality, spirit and auspiciousness	Courage and strength, wealth
3	Hillstone	Hard, difficult to break	Loyal, with perseverance, broad-mindedness

2.2. The advantage of not having power-type

Children like freedom. Compared with activities that are restricted by adult society, children prefer free outdoor games. Due to traffic safety and other factors that cannot be ignored in today's social environment, outdoor play space has become the main place for children to play outdoor games and is equipped with recreational facilities to meet the needs of children. However, in real life, children do not carry out game activities in full accordance with the preset game mode of the amusement facilities but are more inclined to play the subjective initiative according to their interests and participate in the creation of spontaneous games. Without the influence of stereotypes and rules, children can often skillfully use the things around them to meet their needs and purposes and explore unexpected ways of playing [4].

The psychological stage of children in China can be divided into the suckling period (from birth to 1 year old), infancy, pre-school age, early school age, juvenile or school age, early youth, or late school age [5]. Most of the child-friendly play Spaces located in public places target preschool-age children. Children in this age group have not yet formed independent thinking abilities and strong curiosity about things, and behavior mainly relies on instinct. So entertainment for them is often accompanied by oversaturated colors and loud music. But as children grow older, they will soon lose interest in these colorful and blaring music entertainment facilities.

Emerging entertainment facilities such as pirate ships, roller coasters, jumping machines, etc., are activated by electricity or other energy devices to make the human body move quickly to get a sense of weightlessness and other stimulation, challenging people's psychological acceptance. This kind of amusement facility puts people's bodies in a passive state and does not actively control the body to achieve the purpose of entertainment and relaxation. Most close to children's nature, the most traditional forms of play are sliding, swinging, and climbing, which can be operated by non-powered equipment [6].

At the same time, children do not carry out game activities in full accordance with the preset ways of amusement facilities and are more inclined to exert their subjective initiative and participate in the spontaneous games created by themselves. The construction of amusement facilities should leave room for such unexpected play [7].

3. Design Analysis

3.1. Bubble Universe Children's Playground

Bubble Universe Children's Playground was completed in 2020, covering an area of 2,300 square meters, located in Shenyang, Liaoning Province. Its geographical location is adjacent to the residential area and is a sales hotspot for children's places, which is expected to become the core of the park in this area.

It is an outdoor children's space that identifies itself as "semi-indoor", with trees planted around it and the semi-enclosed design of the entertainment facility itself providing shelter and cooling for the crowd. All the entertainment facilities have a white spherical appearance, paved with cobalt blue flat ground, the overall shape is simple and clear, leaving a lot of room for imagination, children can easily associate the landscape with the common things in life, such as foam and the ocean, clouds and the sky, stars and the universe.

The interconnected channels outside the device and the climbing devices inside the device satisfy the characteristics of children who like to arrange entertainment independently. It can be seen in Figure 8.

In addition, the pipe connecting the two devices is used as the support of the swing. The pipe is hollowed out inside and there is a circular hole on the surface to connect the inside and outside. When a child plays on a swing, the wind from the swing passes through the hole, making a sound similar to the sound of insects. It simulates nature with artificial objects and gives children the experience of hearing.



Fig. 1. Partial photograph of Bubble Universe Children's Playground [8].

3.2. Shanghai Fairy Children's Paradise

Shanghai Fairy Children's Paradise was completed in 2021, covering a total area of about 6,000 square meters, located in Xinguoling International Community, Huiji District, Zhengzhou City, Henan Province, and is an outdoor characteristic campground built based on a natural environment.

The design style is a log theme, with the help of natural landforms such as woods, slopes, islands, and open Spaces in the camp, it should adapt to local conditions and integrate into nature. The theme of the park is the Classic of Mountains and Seas, a traditional Chinese myth, but the way of expression is obscure, it is difficult to associate the theme of Mountains and Seas with the appearance and the surrounding environment, and there is no significant feature or symbolic language to show the theme. It can be seen in Figure 9.

The main entertainment is parent-child interaction, operated by an unpowered facility consisting of logs and rope netting. Play has a strong subjective initiative that adults and children can experience. The overall project style is biased towards natural movement, relying on the original natural elements of the site to design the zoning. Different scenes are configured with different products. With the help of natural scenes such as trees, slopes, hills, and woods in the camp, amusement facilities are integrated into nature. It can be seen in Figure 10.



Fig. 2. No power type of Shanhai Fairy Children's Paradise [9].



Fig. 3. A fairy with no. distinguishing features in Shanghai Fairy Children's Paradise [10].

4. Design Case

The whole child-friendly play space is designed with the theme of the sky, with expressions about the changes of time and space: such as the sun in the east and the moon at night, the passage of time from day to night, while stimulating the imagination of children, there is a certain scientific knowledge and traditional culture.



Fig. 4. Overall design sketch of child-friendly play space (Picture credit: Original).

See Figure 4 for the overall sketch. The overall space is mainly divided into five areas, each area has a main color: in traditional Chinese culture, yellow is the middle, green is the east, red is the south, white is the west, and black is the north, emphasizing the orientation. The places in this playground also correspond to the colors.

The eastern space has plenty of trees and non-powered recreational equipment for crawling: a net of white ropes between trees and railings simulates a continuous sea of clouds. Use soft materials above the railing to protect people. The remaining net is some distance from the ground but not high. The expansion is not elastic. The general appearance can be seen in Figure 5.



Fig. 5. Partial design sketch of child-friendly play spaces (Picture credit: Original).

The main body of the western space is two spherical buildings, one large and one small. There are irregular circular holes above the aisles connected in the middle of the two spheres. Sunlight can shine into the aisles from the holes, simulating the circular light spots of different sizes under the trees. Both spheres have climbing entertainment inside. The first big ball is shown in the picture, the middle tree is surrounded by a railing, and the opening at the highest point is only for the adult's head to protrusion, and children cannot reach it. The second ball can be climbed both inside and outside the facility, the outer climbing facility also has the function of seats, and the flexible play equipment allows children to choose their favorite entertainment. The general appearance can be seen in Figure 5.

The space to the south has a large glass greenhouse with a single-log bridge and sand paved with fine sand, and ornamental plants outside. The rope connecting the single-log bridge has five colors, which are green, red, white, black, and yellow. These five colors have the meaning of auspice and peace in Chinese traditional culture and represent the five directions in the four north and southeast.

The middle space is a plaza for running and seating. The image of the seat is a white cloud, and the image of the cloud is composed of tai chi, and the two seats are divided into yellow squares for running. Like streetlights, the streamlined blue lights on the seats come on and off at regular intervals, turning on at night and then off again during the day.

The main space in the north is a semi-enclosed building with an overhead image of a moon and a staircase and slide simulating the image of the Milky Way outside. The external staircase has spotlighted that glow at night. The surface of the building is not smooth, full of uneven particles, giving children a tactile perception. The entertainment facility inside the building is a giant sphere suspended from the ceiling, the surface of the pattern simulates the solar system, such as the Earth, sun, moon, Uranus, and so on. The general appearance can be seen in Figure 5.

5. Conclusion

This study takes child-friendly as the starting point, attempts to analyze the existing outdoor unpowered amusement park discusses how to integrate traditional culture into the design, and designs the ideal model of unpowered entertainment facilities. With the development of science and technology and the expansion of population, the space for individual survival will gradually shrink, and the importance of child-friendly play space will be highlighted - not only related to the physical and psychological demands of children's entertainment in childhood but also related to the future development of children. Childhood lays the tone for a person's life.

References

- [1] Broto. Children's playground design [M]. Tianjin: Tianjin University Press, 2009.
- [2] Yang Yan, Zhang Zhiyan. Application of abstract art visual language in picture books for preschool children. Beauty and Times (Part 1), 2021(11)
- [3] Wu Ronying. Discussion on Product design and culture [J]. Packaging World, 2013(6):18-19.
- [4] Xiang Mengqi, Research on the design of outdoor Children's amusement Facilities based on Spontaneous play, Album: Engineering Science and Technology I, Master Electronic journal Publication Information: Period: No. 01, 2021 Online publication time: 2020-12-16 -- 2021-01-15
- [5] LIN Yiyi. On the Psychological Factors in the Design of Children's Toys (J). Beauty and Times, 2019(3):98-100.
- [6] Zhang Linyue, Zhang Shuyu. Explore the design and layout principles of children's public amusement facilities based on children's behavior and psychology. Science Enthusiast (Education and Teaching), 2019(03)
- [7] Xiang Mengqi, Research on the design of outdoor Children's amusement Facilities based on Spontaneous play, Album: Engineering Science and Technology I, Master Electronic journal Publication Information: Period: No. 01, 2021 Online publication time: 2020-12-16 -- 2021-01-15
- [8] <http://xhslink.com/MqzBku>
- [9] <http://xhslink.com/o9PDRs>
- [10] <http://xhslink.com/iPGBku>