

Children's Museum Design Based on Children's Sensitive Period Theory

Yu Zhang^{1,a,*}

¹School of Creative Media, City University of Hong Kong, Hong Kong, China

^aEmail: scfai_zy@163.com

*Corresponding Author

Abstract: *The purpose of this study is to clarify and value the definition and educational value of children's museums, and analyze how children's sensitive period theory are used in the design of children's museums. This study selects the Hong Kong Children's Discovery Museum as a case study. Through in-depth interviews with the manager of this children's museum, on-site visits and participation in the exhibits and projects in the museum, and then using comparative study method to compare it with children's museums in other countries, the results show that the design of the Hong Kong Children's Discovery Museum is similar to other children's museums, and its exhibits and projects make good use of the children's sensitive period theory. But it is not mature enough, which is reflected in the limited scale, single source of funding, and little cooperation and contact with schools or educational institutions. These results suggest that it is very necessary to design the children's museum based on the sensitive period of children. As a form of informal learning, children's museums can be used as a supplement to formal learning methods and can cultivate the children's ability of active learning and lifelong learning.*

Keywords: *Children's museums, children's sensitive period theory, design of exhibits*

1. Introduction

With the improvement of the educational function of children's museums and the emphasis on preschool children's enlightenment education, informal learning with children as the target group has received widespread attention. As one of the methods of informal learning, children's museum is different from other museums due to its special target audience and important educational functions. Therefore, this paper first makes a clear understanding of the similarities and differences between museums and children's museums through research and comparison. Because of the definition, value proposition and the special target audience of the children's museum, its educational value is particularly prominent. And its educational value is mainly reflected in three aspects.

The theory of children's sensitive period proposed by the Italian educator Montessori is helpful in understanding and studying the behaviors and characteristics of children in a particular period of time. The sensitive period of children is an important period for children's development, and the stimulation of external things is unusual. Meeting the environment and conditions that they need to develop during this period is very beneficial to their future development. Therefore, this study summarizes the definition and characteristics of children's sensitive period theory, and combines the development practice of children's museums to analyze the application of this theory in children's museums. The goal is to provide a reference for the future construction of the children's museum. Because it is necessary for children's museums to construct and design exhibits and educational programs that meet the requirements of children's development in accordance with the characteristics and needs of them in this period, so that children's museums can fully play their functions and roles.

Then, this study selects the Hong Kong Children's Discovery Museum as a case study. And the main research methods are literature research, comparative study and in-depth interview. Meanwhile, this research also selects the Brooklyn Children's Museum and the Please Touch Museum to compare with the Hong Kong Children's Discovery Museum. Finally, based on the seven specific children's sensitive periods included in the children's sensitive period, this article mainly analyzes its application in the Hong Kong Children's Discovery Museum and also mentions some other children's museums. The analysis here is based on the principle of one-to-one correspondence, so that it can clearly explain how this theory and practice interact.

2. Definition and Function of the Children's Museum

2.1 What is the Children's Museum

The term 'Museum' is derived from the Greek language 'Μουσείον'. Its original meaning is the temple to worship the Greek goddess Muse or the place to study and communicate. It can be seen that the 'museum' has a sense of extraordinary and refined in the millennium. In this regard, some scholars have proposed a 'museum effect' (Huo Liyan & Tang Chenglin 2016, p.19), which means that the museum exhibition has a tendency to withdraw from the exhibit itself, and the museum often turns the exhibit into art based on the preferences of the audience, thus offering a careful and thoughtful experience. This perception experience is described by some scholars, they think that the museum will impose a religious silence on the audience, and the audience cannot touch the exhibits. The museum is always empty and has a feeling of puritanical solemnity; the large exhibition hall is decorated in an orderly and unified way, with elaborately carved top walls and steps like a monument. They are magnificent, as if implying a sacred place.

However, the children's museum is a museum for children. The Association of Children's Museums clearly defines what a children's museum is: "A children's museum is defined as an institution committed to serving the needs and interests of children by providing exhibits and programs that stimulate curiosity and motivate learning. Children's museums are organized as permanent non-profit institutions, essentially educational in purpose, with professional staff, which utilize objects and are open to the public on some regular schedule" (Association of Children's Museums, 1992, p.1). So, it can be seen that children's museums are places where children learn through play and exploration in environments designed just for them. Relative to traditional museums, children's museums do not mostly restrict access to exhibits, but encourage children to participate through interactive exhibits.

2.2 Educational value of Children's Museums

As a representative organization dedicated to the development of children's museums, the Association of Children's Museums promotes the continuity of lifelong learning. So the value of education is the most prominent role of the children's museum. With the development of brain science research in the field of early childhood education and the continuous enrichment and change of early childhood education theory and practice, the children's museum has been adjusting its educational form closely following the development of research (Li Shengnan 2011, p.285). Its purpose is to create a learning environment for children that best suits their growth and development needs. From this perspective, the foundation of the children's museum is to respect the development needs of children rather than the interpretation of objects by adults.

At the same time, the children's museum also has the function of social education. One of them is that it helps promote mutual understanding and tolerance between people. For example, the Chicago Children's Museum collaborated with the Autism Project to design a program named Storybook Guide. This project describes every interactive exhibitions at the Chicago Children's Museum from a children's perspective and helps families choose to visit exhibits. Reading and viewing the pictures in the exhibition before the visit of autistic children can help them predict the experience that will happen, so as to alleviate anxiety and the transition. In addition, by working with two occupational therapists at the Belle Center of Chicago, they created a 'Therapy Play Guide' that uses the rich environment of the museum to enable children to build skills in many areas of development, including exercise, senses, language, literacy, social, cognitive, and self-care. Parents, caregivers, and professionals explore the benefits of the game based on the guidance of the 'Therapy Play Guide', using the opportunity to participate in each exhibition to help children with treatment.

The educational value of the children's museum is also reflected in helping children and their families develop good living habits. In 2016, the World Health Organization released a report on ending childhood obesity, aiming to reverse the rising trend of overweight and obesity among children under five. In many countries, childhood obesity has reached an alarming proportion and posed an urgent and serious challenge. The number of globally overweight or obese infants (0 to 5 years old) has increased from 32 million in 1990 to 41 million in 2016 (Mou Danni 2018, p.48). Many factors, such as personal factors and environmental factors, lead to an increase in the number of childhood obesity.

To solve this problem, many children's museums have developed indoor exhibits and projects designed to promote healthy lifestyles. The Boston Children's Museum partnered with Boston Housing Authority to launch an innovative program that provides a museum-style, healthy lifestyle for people

from cities, ethnic minorities, and low-income groups (Kuross. K & Folta. S 2010. p.428). The project, called 'GoKids', has two goals: one is to play a role in the children's museum, to develop interesting and effective ways to learn health; The other is to establish links between museums and audiences, both influenced by health differences and by the general lack of services of cultural institutions. Each event includes a participatory drama performance with a healthy choice and three to six two-hour activities. Weekly event organizers participate in family communication, allowing them to choose which form of activity they prefer in cooking, games, science experiments, music and so on.

In addition, the educational value of children's museums is that it advocates the ecological concept of harmonious coexistence between man and nature. In 1986, the World Health Organization convened the first International Health Promotion Conference in Ottawa, Canada, to adopt the Ottawa Charter. The Charter states (1986) that peace, housing, education, food, income, stable ecosystems, sustainable resource use, social justice, and equity are the basic conditions and sources of health. At present, there are four major challenges in children's lives: the health of lifestyles; the deterioration of the ecological environment; the 'plasticization' of children's play space deprives them of the opportunity to play in nature and the lack of children's creativity.

The children's museum, as an educational institution for children in society, its existence significance and social mission determine that it is obligatory to undertake the important task of advocating the concept of harmonious and healthy coexistence between man and nature. In 2007, the Association of Children's Museums held the 'Kids Dig Dirt! Green Paper'. Its purpose is to advocate the children's museum to properly integrate indoor and outdoor space to provide children and families with the opportunity to contact nature; to emphasize the outdoor experience of the game to the individual health and the importance of facing the challenges of sustainable development in the 'global consistent action' concept; to provide guidelines and examples for the opening of the outdoor activities of the children's museum.

3. Children's Sensitive Period

3.1 Concept of Children's Sensitive Period

The sensitive period of children refers to a period of sensitivity to the environment, order, senses, movements, social norms and a series of other situations, which is caused by the developmental characteristics of children such as intelligence, sense of order, sense of rhythm, walking and observation. The concept of 'children's sensitive period' was first proposed by the Italian educator Montessori (Montessori 1978, p.12). She believed that the child's development has a sensitive period, and it is this sensitivity that allows children to reach the outside world with a unique degree of intensity. During this period, they can easily learn everything with full of energy and passion. Montessori divided the sensitive period into three phases: zero to six years old, six to twelve years old and twelve to eighteen years old (Montessori 1978, p.49). This paper focuses on the sensitive period of children between the ages of zero and six. Because Montessori pointed out that children between the ages of zero and six will be stimulated by inner life activities during the sensitive period, and will absorb the surrounding environment with high interest and enthusiasm. Children's sensitive period includes space sensitive period, order sensitive period, subtle things sensitive period, etc.

3.2 The Significance of Children's Sensitive Period

At the sensitive stage, the child's ability to receive certain stimuli is unusual. The child's special susceptibility to something continues until the feeling needs are fully met. During the sensitive period, young children will continue to repeat a certain behavior until they have new abilities (Sun Ruixue 2010, p.34). This maturity process of building new abilities is not obvious but appears in a sudden and shocking way. And once this new ability is acquired, those repetitive behaviors will disappear. At the same time, young children will start other sets of repetitive activities to acquire other new abilities. If children fail to develop in time with the internal movement during the sensitive period, once the opportunity to learn is missed, it will never be recovered, and even cause developmental problems, which may hinder the growth of the child.

According to these characteristics, this period is the easiest and most rapid period for children to absorb a large amount of knowledge, develop their own potential, master basic skills and develop good habits. It is also known as the 'critical period of learning' or 'critical period of education' by educators (Zhang Xuan 2016. p.56). Sensitive periods are temporal, not permanent. So missing these critical

periods can become a permanent obstacle. The sensitive period is not only the critical period for children to learn at a specific age, but also affects the development and cultivation of their personality, psychology, and values. The sensitive period is the life-giving power that nature gives to young children. If the inner needs of the sensitive period are hindered and cannot develop, the best time for learning will be lost. In the future, if children or adults want to learn or make up for this, they will not only have to pay more effort as well as time, and results are mostly not satisfactory. In short, it is necessary to fully understand, learn and analyze the physical and mental development characteristics of children in a sensitive period, so that children can be fully developed. At the same time, it is important to understand what children need most at a particular stage, according to the child's psychological development characteristics, and to provide the necessary external environment for their growth.

3.3 Characteristics of Children's Sensitive Period

3.3.1 The sensitive period of the Hand

In the development period of hand movements, the sensitive period of reaching for objects is about five months old, and the sensitive period of exploring and understanding the world with hands starts at eight or nine months old. The sensitive period of fine movements from grasping with one hand to grasping with three fingers to grasping with two fingers is one and a half to three years old. When infants and young children are in this period, their hand movements have intellectual goals, which is also the way they know the world.

3.3.2 The Sensitive Period of Walking

The sensitive period of children's walking is around one to two years old. From the beginning, they rely on adult-assisted walking, and then they can walk on their own and like to explore the world on the undulating road. Children like to go uphill and downhill, climb stairs, and walk on the uneven place, and these are the typical performance of this sensitive period.

3.3.3 The Sensitive Period of Small Things

Children's sensitive period of small things occurs at the age of one to six. It is the way of children's behavior during this period to understand the world from the microscopic level and put small items close to them or in their hands. Unlike busy adults who look at the world, children often capture the tiny things in the world and love to explore their mysteries.

3.3.4 The Imitation Sensitive Period

Children are in the imitation sensitive period at the age of two to six. Their main features are from simple imitation of adult expressions, movements, words, and imitation of specific scenes. Children who are sensitive to imitation are often curious about adult life and the world. They often play a game called 'family' with their partners. In the game, they pretend to be adults and use various materials to imitate their daily life behaviors, such as working as parents, buying vegetables and cooking. In addition, they will also play 'teachers and classmates' scene games. They usually try to use the simple materials and atmosphere, which can complete the simulation of the scene with a kind of creativity.

3.3.5 The Order Sensitive Period

The sensitive period of order usually occurs in children between two and six years old, and its performance is characterized by the existence of a constant procedure and order in the world, which enters the heart of the child as its initial logic. Children need an orderly environment to help them understand things and get acquainted with the environment. The order sensitivity of young children is often manifested in the requirements of order, living habits, and belongings. According to Montessori (1978), if adults fail to provide an orderly environment, children have no basis to establish perceptions of various relationships.

3.3.6 The Space Sensitive Period

The earliest form of the space sensitive period is that children are keen on crawling, grasping, and displacing materials. After that, they prefer to stuff things into narrow closed or open space, such as small holes, and then they start to abandon, repeatedly build high and push down, enjoying it. Then they will have a strong interest in different spaces, such as small and multilevel space, and like to climb to the heights of the three-dimensional space.

3.3.7 The Sensory Sensitive Period

The sensory sensitive period of children occurs between zero and six years old. They understand and familiarize themselves with the environment with senses such as hearing, sight, taste, and touch. Before the age of three, children absorb the surrounding things through the subconscious 'absorbent mind'. From three to six years old, they can judge the things in the environment more specifically through the senses. Therefore, Montessori has designed many sensory aids, such as the hearing tube and the tactile plate. Her aim is to make the child's senses more sensitive and guide the child to produce wisdom.

4. Hong Kong Children's Discovery Museum - A case study

4.1 A site visit

The Hong Kong Children's Discovery Museum is located on the first floor of the China Hui Centre, 28 Marble Road, North Point, Hong Kong, and the area of this museum is about 6,600 square feet. The museum is divided into four permanent exhibition halls: 'Tinkering Lab', 'Our Natural world Our Consumer World', 'Story Stage', and 'Transits Tots'. It is open from Tuesday to Sunday and is divided into three time periods. There are 2.5 hours in a time period, and each time period can accommodate up to 150 visitors. The Hong Kong Children's Discovery Museum opened in mid-September 2018, and up to now, it can be known from the official website of Hong Kong Children's museum that the number of student visitors has reached about 8,000. The exhibits are designed for children under the age of 10 and encourage participation with family members.

Hong Kong Children's Discovery Museum is the first children's museum in Hong Kong. Its mission and vision are: "enriching children's lives through educational hands-on exhibits, play-based learning experiences, and interactive facilitated programs. It builds strong family relationships through meaningful play interactions to spark life-long learning across generation, and it cherishes children's unique potential so that they can flourish as constructive, well-balanced, and passionate citizens of the global community".

4.2 Evaluation of the interview with the manager of the Hong Kong Children's Discovery Museum

By interviewing the museum manager (interview questions are in the appendix), it can be known that the museum is privately built and needs to be operated by selling tickets and accepting donations. So it is divided into different time periods to open, and visitor tickets are only valid for a certain period of time. Visitors are mainly concentrated on weekends and public holidays, so the museum raise the ticket price at this time. In the process of visiting and playing in the museum, the museum staff generally do not take the initiative to guide the children or parents unless they ask for help. From this point, it can be seen that the museum hopes children actively learn and think independently while playing, thus stimulating their creativity. After visiting the museum, children and adults had different feedback on it. Most of the children responded that this museum was very fun, and they can learn certain knowledge. And parents often compared other museums to this museum, such as the Hong Kong Science Museum. At the same time, through interviews, it can be known that the museum used the theory of the sensitive period of children in its design.

In general, the overall access process is relatively smooth. Although on the last question, the manager of the museum did not give an answer.

4.3 Hong Kong Children's Discovery Museum in comparison with other Children's Museums

Compared to the Brooklyn Children's Museum, the world's first children's museum, the Hong Kong Children's Museum is smaller. The Brooklyn Children's Museum is more than twice the size of the Hong Kong Children's Discovery Museum. The Brooklyn Children's Museum is relatively mature, with exhibitions and projects involving science, art, and nature. The latter was built on the foundation of the American Children's Museum and has its own focus on exhibits and projects. In addition, compared with the Brooklyn Children's Museum, the Hong Kong Children's Discovery Museum has a relatively simple approach to financing and has less contact and cooperation with schools and other educational institutions.

Please Touch Museum is a Children's Museum designed based on the Montessori education concept.

Similar to the Hong Kong children's museum, its mission emphasizes children's interest in learning through playing, thus forming the ability of lifelong learning. The exhibits and activities of the two children's museums emphasize the children's initiative to explore and fully satisfy their curiosity. In addition, according to the interview, the Hong Kong Children's Discovery Museum also refers to Montessori's theory of children's sensitive period in its design. Therefore, these two children's museums have certain similarities in exhibits and projects.

4.4 Children's Sensitive Period as part of the construction of the Children's Museum

4.4.1 The Sensitive Period of the Hand - the combination of Multimedia and Reality

In response to the characteristics of children in this period, the children's museum can use multimedia technology to combine reality to create a facility and space suitable for children's development. As the technology development of multimedia continues to mature, many children's museums have integrated multimedia technology into construction. In the Hong Kong Children's Discovery Museum, there is an exhibit called 'Topography Table'. This exhibit uses multimedia sensing technology to fully exercise the flexibility of the child's hand and stimulates the sensitive period of the hand. As seen in figure 1, sand is used to simulate different terrains in this exhibit. By adjusting the shape and height of the sand, the media sensing system determines which terrain is based on the shape and height of the sand and then displays the different colors. For example, a low-lying place will be projected in blue, representing a river.



Figure 1: Topography Table in the Hong Kong Children's Discovery Museum.

And at the Please touch museum in Philadelphia, there is a venue called 'River Adventures'. In this venue, the designer combines the use of multimedia technology and digital technology to enable children to experience life in a simulated nature. Inside, children can touch and experience animal specimens, feel the time zone changes and atmosphere of different parts of the world, and follow a series of rules of development and change.

4.4.2 The Sensitive Period of Walking - Three-dimensional Design

Children like to go uphill and downhill, climb stairs, and walk on the uneven place, and these are the typical performance of this sensitive period. According to this characteristic, the designer of the children's museum adopt the three-dimensional design in the planning and construction of children's museums. First, on the flat ground, they prefer to design different shapes and colors so that children can step on them according to the shapes and patterns. Children are naturally curious about the world, so when designing the venues, designers pay attention to the fluctuations of the venue. Even delicate and subtle changes can bring great interest to children. For example, the laying of pebbles on the ground, the arrangement of a small bridge and the depiction of the sun allow children to dance and play with their hands and feet for a long time. In the Hong Kong Children's Discovery Museum, there are small bridges and undulating grounds designed to give children full stimulation of the sensitive period of walking (see figure 2).



Figure 2: Small bridge of Transit Tots in the Hong Kong Children's Discovery Museum.

4.4.3 The Sensitive Period of Small Things - 'Micro World' Design



Figure 3: Mural of Change in the Hong Kong Children's Discovery Museum.

During this period, children's understanding of the world begins from the microcosm. Therefore, when children are interested in the small ants on the ground or small patterns on pants, it is a good time to cultivate children's carefulness and seriousness. For toddlers, the grass and trees in the garden, a bird on the square, and a button on the clothes can surprise them. The exhibit called 'Mural of Change' (see figure 3) in the Hong Kong Children's Discovery Museum refers to the performance characteristics of children in this sensitive period, thus combining environmental protection with colorful caps. By interacting with the exhibit, children can learn to protect the environment from the list in the exhibits. Every promise to complete one, the child can pick a color cap to add to the wall. It not only instills the child's concept of protecting the environment but also satisfies the characteristics of children's sensitive period.

4.4.4 The Imitation Sensitive Period - 'Adult World' Design

Children hold curiosity about the adult world during this period and like to imitate adult behaviors and activities. For example, they usually play 'teachers and classmates' scene games. And they try to use the simple materials and atmosphere that can be used at hand to complete the simulation of the scene, and usually with a kind of creativity. One of the exhibition halls of the Hong Kong Children's Discovery Museum is on the theme of the 'Story Stage' that allows children to play and imitate adult lifestyles and careers in a smaller adult world. For example, a child can be an anchor in a Story Spot Studio (see figure 4). At the Brooklyn Children's Museum, children can play the role of baker, shopper,

and architect in the 'Brooklyn world', one of the permanent exhibitions.



Figure 4: Story Spot Studio in the Hong Kong Children's Discovery Museum.

4.4.5 The Order Sensitive Period - 'Home' and 'Flexible' Design

As children gradually establish internal order from the environment, their intelligence is gradually constructed. Accordingly, it is possible to provide movable and sturdy interlocking facilities for them to play and appreciate the order environment, such as observing simple traffic rules, and other facilities that can cultivate children's good sense of order and living habits. Only when they are cultivated it from a young age can they develop a good sense of personal habits and order, and in the future will be conducive to the formation of a sense of responsibility and order towards society. In this regard, one of the exhibition halls in the Hong Kong Children's Discovery Museum can provide a reference. The theme of this exhibition halls is 'Transit tots', which enables children to obey the traffic regulations and deepen the cultural identity of Hong Kong (see figure 5).



Figure 5: Traffic lights and Hong Kong culture of Transit Tots in the Hong Kong Children's Discovery Museum.

4.4.6 The Space Sensitive Period - Multilevel Design

Children in this period are no longer satisfied with staying in a fixed or single place but are devoted to exploring the new and interesting 'new world', which emphasizes the richness of the children's museum space. Therefore, in the design of the museum, the designer of the children's museum should pay attention to two aspects. One is a multilevel design in a single space, which refers to the physical division of space into different levels by nesting in a specific space. For example, in the climbing project of the Hong Kong Children's Discovery Museum, the climbing project's facilities named 'Climb the Banyan Tree' are spliced together by a piece of board, and protected by a sturdy net (see figure 6). The route inside is intricate, and children can climb from the first floor to the third floor. On

the other hand, it should also be noted that there are multiple levels in time and space. The museum can be decorated with different regional style space and facilities so that children can experience different cultures and customs inside. In the Boston Children's Museum, children can experience the local customs and conditions of other countries. When they enter a room, Japanese style culture and customs are displayed in the space, such as tatami, screens and a series of furniture and facilities with Japanese style, so as to create a cultural atmosphere different from that of the local people.

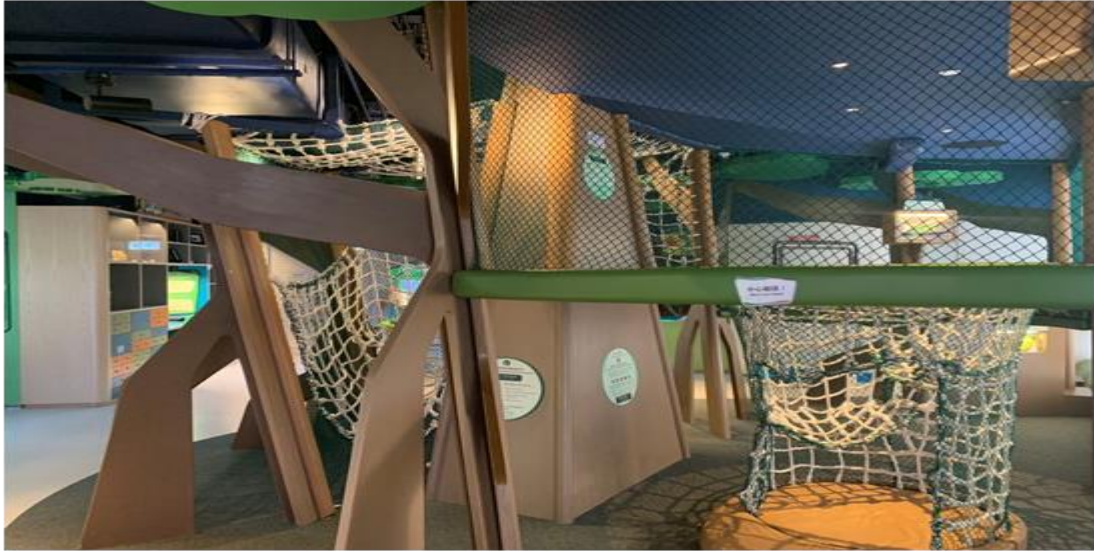


Figure 6: Climb the Banyan Tree in the Hong Kong Children's Discovery Museum.

4.4.7 The Sensory Sensitive Period- Inspirational paradise Design



Figure 7: The staff is demonstrating how to play the Sound Creator.

When designing children's museums, designers like to pay attention to the soul of the space and grasp the sensory characteristics of children's hearing, vision, touch, taste, smell and other aspects to create a paradise for inspiration. The exhibits and facilities in the children's museum often combine the stimulation of multiple senses. In this way, the sensitive period of children is fully stimulated, triggering their interest and inspiring their creativity. The 'Sound Creator' (see figure 7) of the Hong Kong Children's Discovery Museum can reflect this. This exhibit contains eight hollow tubes of different lengths and colors, and various percussive tools. Children can choose different tools to beat the eight tubes. Since the length of the tube and the tool used for percussion are different, the sounds produced are also diverse. Children can create their favorite music while tapping, which is conducive to

the cultivation of their creativity.

5. Conclusion

The children's museum is based on the museum and its target audience is the child. In the children's museum, a variety of exhibits, facilities, and activities are designed to develop children's interest in learning and form a lifelong learning habit. Unlike exhibits that are beyond the reach of traditional museums, children can interact with exhibits in the children's museum. The children's museum covers a wide range of topics, including science, art, and nature. And it conforms to the developmental characteristics of children and their social functions. Among them, the educational value of the children's museum is the most important. Because it not only plays a vital role in the future development of children but also promotes the development of society to a certain extent.

According to the characteristics of children's development, the Italian educator Montessori put forward the theory of children's sensitive period. The sensitive period of children is an important stage in the development of children, because if the conditions and environment for children are suitable for development during this period, children can significantly improve their creativity, thinking ability and practical ability. It will have a great impact on the child's psychology, personality and learning attitude.

As a place for children to play and learn, the Children's Museum attaches great importance to the growth of children. From the case study of the Hong Kong Children's Discovery Museum, through interviews with its manager and inspections of exhibits and projects in the museum, it is possible to clearly see that the theory of children's sensitive period is used in the design of the museum. By comparing the Hong Kong Children's Discovery Museum with other more representative museums, the role and design concept of the children's museum can be seen from their similarities and differences.

Montessori understands the importance of the environment's impact on children's individuality. Her educational concept is characterized by creating an environment that delights children and providing special facilities and materials for children to develop themselves. With the development of modern economy and the continuous shrinking of material restrictions, it is increasingly possible to apply the theory of children's sensitive period to the environment of children's growth. As a supplement to educational institutions such as schools, the children's museum is a great place to turn this theory into reality. Children can only develop further if all their growth needs are fully met. In general, grasping the behavioral characteristics and methods of children's sensitive periods is one of the important contents of the design and construction of children's museums.

References

- [1] Association of Children's Museum 2007, 'Kids Dig Dirt! Green Paper.Washington: Association of Children's Museum', retrieved 23 February 2019, <http://childrensmuseums.org/images/Library/acm_kidsdigdirt_greenpaper.pdf>.
- [2] Association of Children's Museums 1992, 'Standards for Professional Practice in Children's Museums', retrieved 23 February 2019, <http://childrensmuseums.org/images/Library/Standards_for_Professional_Practice_in_Childrens_Museums.pdf>.
- [3] Boston Children's Museum, *About Boston Children's Museum*, retrieved 25 February 2019, <<https://www.bostonchildrensmuseum.org/>>.
- [4] Bourdieu, P., Darbel, A. and Schnapper, D., 1991. *The love of art: European art museums and their public* (p. 53). Cambridge: Polity Press.
- [5] Brooklyn Children's Museum, retrieved 25 February 2019, <<https://www.brooklynkids.org/>>.
- [6] Chicago Children's Museum, retrieved 19 January 2019, <<https://www.chicagochildrensmuseum.org/>>.
- [7] DiBianca Fasoli, A., 2014. *To Play or Not to Play: Diverse Motives for Latino and Euro-American Parent-Child Play in a Children's Museum. Infant and Child Development*, 23(6), pp.605-621.
- [8] Hong Kong Children's Discovery Museum, retrieved 19 January 2019, <<https://www.childrensdiscoverymuseum.hk/en/aboutcdm/>>
- [9] Huo Liyan & Tang Chenglin 2016. 'Across the centuries of beauty - the history of the development of children's museums in the world', *Primary & Secondary Schooling Abroad*, 7(2), pp.19-27.
- [10] Kuross, E. and Folta, S., 2010. *Involving cultural institutions in the prevention of childhood obesity: the Boston Children's Museum's GoKids Project. Journal of nutrition education and behavior*,

42(6), pp.427-429.

[11] Li Shengnan 2011. 'Talking about children's education in museums from the psychological characteristics of children', *Suzhou Archeology and Museology Review*, 5(2), pp.284-287.

[12] Mou Danni 2018. *Research on the Development of Educational Function of American Children's Museum*, Master Comparative Education thesis, Harbin Normal University, retrieved 22 February 2019, Cnki database.

[13] Montessori, M., 2013. *The Montessori method*. Transaction publishers.

[14] Montessori, M., 1978. *The Secret of Childhood*, Barbara Barclay Carter, Sangam Press, India.

[15] Sun Ruixue 2010. *Capturing children's sensitive period*, China Women Publishing House, Beijing.

[16] Zhang Ni 2016. 'Education Philosophy of the Children's Museum', *Journal of Natural Science Museum Research*, 4(6), pp.53-60.

Appendix

Interview questions:

Why is it that the day is divided into different time periods to open?

How many visitors per day at the Hong Kong Children's Discovery Museum?

How many visitors can be accommodated in the Hong Kong Children's Discovery Museum every day?

What age are most children who come?

How long do the children spend on average in the museum?

How do children use these facilities (specific facilities)?

Are there certain applications that children prefer? What are these?

Do you know why these facilities are so prominent?

What can children learn from these facilities?

What role does the child's parents play in the facility?

How do the museum staff involve the parents in the educational process?

What is the feedback of the children?

What is the feedback of the parents?

When designing this Children's Discovery Museum, did you refer to the theory of children's sensitive period?

If you could set up or design the museum again, what would you change? Why?