



POLITECNICO
MILANO 1863

INTERIOR AMUSEMENT PARK

Children physical activity space research and design

Master of Science in Interior and Spatial Design
A.A. 2019-2020
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Aacknowledgments

This paper was completed under the guidance of Barbara Camocini and it will be the perfect end of my academic time in Politenico di Milano. I would like to thank all the professors I met in the past two years, all the new design concepts in Politenico di Milano are quite different from my previous undergraduate studies. In each semester, I had chance to meet with team members from different countries, we shared our own culture. The learning experience of these past two years is very valuable to me.

Moreover I would like to thank my tutor, professor Barbara Camocini. Although we had a very inconvenient year for travelling in 2020, professor Camocini actively organized our video meeting to explain to me from how to construct the study to improve my project from the end of last year to the present. She was very patient and even spare time to give me suggestions for modification during her vacation, which was very helpful to me to finish my thesis.

ABSTRACT

The recent statistical data on various countries highlight the problem of too much screen time for children than recommended by world health institutions. The major consequences are the lack of physical activities and the excessive sedentary behavior that are causing children's obesity rate increasing year by year. Parents are busy with their work, the scarce parent-child time generates a sense of loneliness and diffidence that could become real problems on the road of children's growth.

Sports will be a good solution both to children's physical and psychological problems. Therefore, the purpose of this study is to conceive children physical activity places designed especially for children's health guarantee. This study will try to seek a balance between digital technology and children's physical activities, in order to help children cultivate their strength, physical coordination and adaptability, also providing enjoyment and recreation, making sure that it meets the rationality and safety requirements of children's use and arousing their interest in sports and interaction with others.

This place will be located in a theme park in Jiangsu province in China and designed basing on the analysis of similar children's physical activity spaces. Collecting physiological data of children and the opinions of parents and children on this kind of spaces, the feedback statistics will be used to analyze children's preference.

The arrival of the digital age is an inevitable trend, we can not deny that it helps parents and children in daily life. Whether the offline activity center could win more market share? Nowadays, the work pressure of Chinese parents is relatively high, and there is not enough time to accompany children. Whether it is a better solution to send children to such a playground cared by professional staff.

ABSTRACT

Statistiche recenti su vari paesi hanno evidenziato il problema che il tempo trascorso davanti allo schermo dei bambini supera le raccomandazioni dell'Organizzazione Mondiale della Sanità. La principale conseguenza è la mancanza di attività fisica e comportamento sedentario, che porta all'aumento del tasso di obesità dei figli di anno in anno. I genitori sono impegnati con il loro lavoro e la scarsità di tempo tra genitori e figli può far sentire i figli soli e insicuri, il che potrebbe diventare un problema per la crescita dei figli.

L'esercizio fisico sarà un buon modo per risolvere i problemi fisici e psicologici dei bambini. Pertanto, lo scopo di questo studio è concepire un luogo per attività sportive per bambini progettato per proteggere la salute dei bambini. Questo studio cerca di trovare l'equilibrio tra la tecnologia digitale e le attività sportive per bambini, al fine di aiutare i bambini a sviluppare forza, coordinazione fisica e adattabilità e fornire intrattenimento per soddisfare i requisiti di razionalità e sicurezza dell'uso dei bambini, stimolare il loro interesse per l'esercizio fisico e interagire con gli altri.

Il progetto sarà situato in un parco a tema nella provincia di Jiangsu, in Cina, e sarà progettato sulla base dell'analisi di spazi simili per attività sportive per bambini. I dati fisiologici raccolti dei bambini e le opinioni di genitori e bambini su questo spazio, le statistiche di feedback verranno utilizzate per analizzare le preferenze dei bambini.

L'arrivo dell'era digitale è una tendenza inevitabile, non si può negare che sia utile alla vita quotidiana dei genitori e dei figli. I centri di attività offline possono conquistare più quote di mercato? Al momento, i genitori cinesi sono sottoposti a forti pressioni dal lavoro e non hanno abbastanza tempo per accompagnare i loro figli. È una soluzione migliore mandare i loro figli in un tal parco giochi con cure professionali.

KEYWORDS

Based on **children's physical and mental health**, the study aims to reduce children's **screen time**, **obesity rate** and increase children's physical exercise, so as to bring parents and children a perfect activity space experience. The lack of **parent-child interaction time**, **inadequate care** for children in public space and comfort emotional children are the main problem need to be solved in **children physical activity space**.

Children physical health

Children mental health

Screen time

Obesity rate

Parent-child interaction

Inadequate care

Children physical activity space

PAROLE CHIAVE

Spazio di attività fisica per bambini

Interazione genitore-figlio

Salute fisica dei bambini

Salute mentale dei bambini

Tempo sullo schermo

Tasso di obesità

Cura inadeguata

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Contemporary children's environment

This chapter briefly analyzes all kinds of children's activity spaces in the market, and the social status causes children to have too much screen time, so as to put forward the phenomenon that children's growth lacks sports nowadays. The purpose of the whole study is to solve this problem, Provide indoor physical activity place which is beneficial to children's physical and mental health.



1.1. Multiform emerging children's activity space

With the increasing popularity of today's social education, many developed and developing countries have provided free basic education service for children. Children's rights to be free educated is emphasized within the declaration as well as the 1966 International Covenant on Economic and Social Cultural Rights (ICESCR) and the 1989 Convention on the Rights of the Child (CRC), for example, the nine-year compulsory education in China (for primary and junior high school studies) and tuition free in public schools in many European countries.

In addition, in order to deeply discover children's interest and hobbies, more and more skill training institutions established in the market, including musical instruments, painting, sports, science and so on. These institutions are the places where children can gain knowledge, meet people and make friends. Providing a better learning environment and plans for children has also become one of the effective market competitiveness of various educational institutions.

Except learning places, there are also children's playgrounds which include various kinds of children's amusement parks, toy malls, science and technology museums, libraries and other places for children's recreation and entertainment. The government and other departments built some of them for public welfare, on the one hand to provide children with a more comprehensive learning environment, on the other hand to optimize urban comfort, beautify the image of the city. It also provides parents a more convenient way and environment to educate their children, and some other places are used for commercial activities and aim to make profit, therefore, it requires specific market advantages to attract customers.

In some market cases, it can be seen that some commercial institutions normally have unique methods of doing business that brings joy to children, as well as the design innovations that enhance children's creativity and aesthetics. Children can feel free to touch new things in these specific places designed for children, gain different kinds of knowledge outside the classroom and stimulate children's nature.



Fig 1.1. Lishin elementary school library in Taiwan.



Fig 1.2. Children's swimming pool in Suzhou



Fig. 1.3. Children's boutique in Valencia.

1.1.1. New trends of children's lifestyle in the digital era and the related health strategies

There are plenty of electronic products in the market designed to accompany the growth of children, this caused negative impact on offline activities, physical stores. From the 90's, cartoons and variety entertainment shows began to be broadcasted on children's channels on TV, and now more and more applications were developed on carry-on devices such as smartphones and smartwatches. These could easily achieve education and entertainment purposes. Much knowledge and pleasant experience that can be learned while sitting at home using devices indeed bring convenience to both parents and children. However, growing in this way also has some drawbacks, some of which have effects on physical health, and some of which badly hinder the development of children's social communication skills.

Various educational institutions also have combined with multimedia education one after another, which share educational resources through the internet to a greater extent timely, and provides 3D immersive interactive teaching experience to children, so that more children are able to access to new technology. This method will be the inevitable trend of social development as well. As for video games, these could bring fun and relax to children in the simplest way and targeted to provide children with different areas of cognition at the same time.

Due to the development and popularization of electronic products, problems of lacking exercise have been caused to the growth of new generation of young people. In 2014, Chinese government proposed "three steps" activities on campus, in which school-aged children are organized orderly to be out of the network, out of the dormitories, into the playground, physical education teachers led students to carry out exercise for one hour every day, including martial arts, running, group fun games and other activities, so as to improve the mental health, physical fitness and bone development of young people in a better way. At the same time, it also combined intangible cultural heritage, folklore and historical resources, including Taichi, mule, kites and other community activities, and let children get familiar with the concept of national culture.

1.2. Children's ages and their main activity spaces

Children's intellectual development is largely due to internal maturity, which has no relationship with the outside world, this opinion gained more and more recognition. Before the relevant central nervous system matures, learning to walk takes a long time to practice even if it has aroused the baby's interest in various walking attempts, but at the best of times, the baby can learn to walk without extra effort [1]. Therefore, in the education of children with different ages, we must understand the internal development of children at all stages first.

The book named "Development Profiles: Pre-Birth Through Adolescence" contains detailed description of the various stages of children's physical and psychological growth. Before designing a children's place, we need to understand the children's behavior ability and interest first. I summarized it roughly and divided children into five different age groups, which are shown in Figure 1.4.

Infancy period	Early childhood	Young children	Midterm children	Teenage
0-12 M	12-24 M	3-8 Y	9-12Y	13-19 Y

Fig 1.4. Children age groups of different period

The baby's body changes dramatically during infancy period period. Height and weight increase faster than at any time in life. Nutrition is a necessary condition to ensure the baby's health. This period is also one of the most important stages of brain development for the size of the brain (the number of brain cells) and the establishment of neural links, both of which are necessary for language, perception, movement and personality. Many factors influence this learning process, including genes, culture, environment, and the expectations of individuals interaction with infants. Children in this age group are less immune and require longer periods of sleep, therefore, they spend most of the time staying at home. Infants within four months are limited by the musculature development, they are unable to move forward on their own, and start learning to crawl after four months. At present, there are also plenty of early education institutions that help parents teach their children to crawl and walk, however, parents should not leave their children without mobility even if there are lots of professional caregivers. In addition to indoor activities, parents should take their children outside to enjoy the sun in a garden or park where is not far from their home. On the one hand, it helps improve children's immunity when contacting with the outside space; on the other hand, babies at this age also love bright things.

Early childhood is the period that toddlers begin to slow down their growth and develop more motor skills than their cognitive development, understanding causality, judgment of size and distance, mastery of function, etc. This greatly increases their risk of accidental injury. The vocabulary they have learned, the ability to express was still limited, but the ability to understand language greatly improved though listening to adult reading, singing and imitating adult behaviour. They are full of curiosity. Children learn to walk from need of auxiliary standing to independent walking with great improvement in athletic ability. However, these behaviours are needed to be accompanied by the parents or teachers, children of this age are not able to move independently. For early childhood development of this age group, there are also early childhood swimming pools, early childhood education institutions, although such institutions have professional caregivers, but the children's ability to operate is limited, still need the company of parents. At the same time, children at this period love to imitate the action of adults, they prefer staying with their peers to play the role of different family members, and this kind of activity also needs to take place within the sight of the parents.

Young children's physical development gradually improved, so that they have the ability to take care of themselves. Children of this age are curious and enthusiastic about everything. They are willing to try and accept challenges and expect to be appreciated by adults. Pre-school children, usually are sent to kindergarten. There are teachers in the kindergarten with group care, not only give parents time to relax and be free, but also give children the space to get along with their peers, children in kindergarten have not been aware of learning things, it can increase children's awareness in a happy atmosphere of entertainment through various activities. When entering primary schools and various interest courses training institutions, children began to study all kinds of majors consciously.

Girls of midterm children tend to grow faster than boys during this time, and individual differences are significant. Most children are carefree, happy, energetic, diligent and studious. They have gained plenty of abilities to gradually change from self-criticism to self-confidence in their abilities. There are also many children who have their own unique interests and hobbies, and they take delight in finding peers with the same hobbies to share these things. Although friends and friendships are important, family relationships are still precious. Participation in group activities and team sports are excellent ways to expend energy, develop social skills and maintain friendships. As children enter primary and secondary or professional schools, physical activities are also important for children of this age group, children are happy to participate in all kinds of group sports activities, so playgrounds and all kinds of activity spaces play an important role in the growth of children of this age group.

Teenage period is mainly a change in brain development from self-doubt and self-examination to self-identity and satisfaction. Teenagers face a lot of new opportunities and experiences, such as seeking emotional support from their friends, impulsive to being able to treat adult advice with an open mind, and being able to achieve complex learning. Their thoughts change from early the worries about appearance, friendship, studies to later concerning about the future, which is more ideal and calm. Most teenagers leave the campus of high school group life to the society or the university, basically are able to complete all kinds of life trivia independently, the cognition gradually consummates, the growth safety risk also reduces much. Teenagers have less and less family time and begin to walk into all kinds of social places alone. They prefer to get along with their peers, and their peers around affect them both learning and entertainment easily.

1.2.1. Target user of this study: 3-12-year-old children

The purpose of this study is to provide sports venues and internal activities for user to improve children's psychical and mental health. Young children and midterm children are selected as the objectives. On the one hand, it is to ensure that children have enough sports ability in public activity space, and they need and are willing to follow the requirements of coaches or Venue Managers. Children's safety is the first element of any children's activity place, the children of infancy period and early childhood have limited activity ability, need more professional and comprehensive care, and sports events are also limited, so they are not the research target group for this study. On the other hand the whole space is created especially in "a smaller size" that make children whose bones and muscles are growing fast feel comfortable. The physiological characteristics and behavioral performance of children in teenage period are close to adults, so these children's activity facilities are smaller for them. Also, they can complete all kinds of sports by themselves without special care and they prefer to have their own space in this period.

Young children and midterm children are the children between 3-12 years old, first of all, according to the psychology of these children, they are divided into pre-school and post-school. Pre-school children are active every moment of waking time, eager to know everything. They are eager to prove themselves to adults through their own efforts and expect to be appreciated by adults. Therefore, the safe environment provided by adults is very important to allow children to practice freely, while giving children some safety restrictions on their activities to prevent unforeseen consequences of allowing children to act independently. Specific recommendations for children of all ages help children develop in all areas and potential stunting.

Children at the age of school tend to have periodic reluctance and frustration, because they often set high expectations and begin to vacillate when they did not reach the aim. However they are still eager to learn. At this stage, children are easy to acquire many new skills, independence is increasing, and friends and friendship are becoming very important. Children begin to understand the complexity of daily life and form their own morality and opinion. Children at this stage are fully able to take care of their own personal lives, but occasionally require adult reminders. Children of this age can slowly build up their own space, away from their parents' company all day. This is period that they switch their main activities from family to school.

This study provides three to twelve years old children and their parents a space to stay alone or together, to meet the needs of different groups of people, help children to find the fun of sports. Through sports and games to bring children not only physical health, but also psychological sense of achievement, enhance children's self-confidence, help solve the parent-child relationship problems. It's also a good place for parents who are busy with their work or other things to leave their children here, there will be professional coaches and staffs to look after their children.



Children's social status and its issues

Young children today are growing up in digital contexts [2]. There are more and more digital screens in our lives, therefore the screen time will inevitably increase and will be a trend of social development in recent years and in the future. Electronic equipment has brought a new era in the lifestyle and in the relationship between parents and their children. Modern technology can let children have access to learn the unlimited knowledge in a limited space. Beside that electronic products are also an extremely simple way to make children feel happy and relaxed. However, this phenomenon has brought some health effects to the new generation of children, such as vision problems, sedentary problems and being addicted to video games. Social interaction at the back of the screen also gives children a sense of fear and some psychological barriers in real social life. Social research institutions have given suggestions for children's healthy growth. This chapter will introduce the main health problems and some solutions in the growth of contemporary children.

2.1. Screen time risks to children's health

During the COVID-19 pandemic period in the first half of 2020, online courses have been set up in primary and secondary schools to replace offline courses. Through electronic products, children was able to feel almost the same classroom atmosphere at home, the face of teachers and students who ask questions or answer questions could be seen in electronic equipment, their voices could be heard as well. However, massive open online courses (MOOC) have attracted more and more attention since 2012. For example, Coursera (figure 2.1) is an American company that works in online class, it has cooperated with 33 famous universities around the world, such as Columbia University and Princeton University. After Coursera brought these famous universities online class to the students, the number of audiences began to increase. Various kinds of preschool education animations, foreign language classes could be taken at home, fitness videos and other courses appeared in the online market. The comprehensive popularization of mobile and computers, the continuous improvements of various functions of software have indeed brought convenience to parents and children.

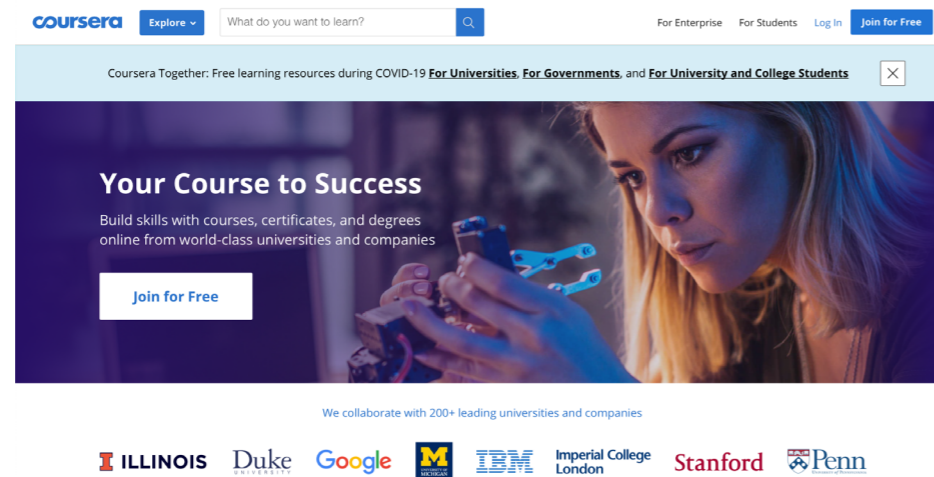


Fig 2.1. Coursera website during COVID-19 pandemic period

What children learn while watching TV is easier to be accepted and children seem to feel happier at home than in class. Children may associate using digital technologies with positive feelings. As with any non-digital activity, a child who is engaged with a digital activity is likely to feel happy and/or satisfied. Children can also feel positive emotions when they achieve success with digital games or apps. Depending on the features of the digital game-playing experience, playing can help young children learn to concentrate on one task for an extended period, and can also provide opportunities for children to develop qualities such as persistence, resilience and self-confidence [3].

British psychologist Dr. ARIC Sigman once pointed out that spending plenty of time in front of the screen will hinder children's development and affect their health. In the United Kingdom, children aged about ten can have access to five different screens at home on average, while teenagers spend up to six hours touching screens. More than two hours of screen time has begun to have a negative impact on children's growth. American Academy of Pediatrics suggests that children under 2 years old should not watch TV or other electronic devices, and children aged 5 and under are prohibited from using electronic devices one hour before going to bed. Parents can set their mobile phones to "do not disturb" mode when playing with their children. Parents can specify the screen viewing time of school-age children and adolescents over 6 years old and what type of electronic devices to use, so as to ensure that sleep, exercise and other healthy behaviors will not be affected by the screen time. Parents can also stipulate within mealtime and some specific places such as bedrooms cannot play mobile phones, computers or watch TV.

Many researches have focused on the extent to which children adhere to the recommended 2-hour daily maximum of screen time, with it increasingly apparent that most children, across a number of countries, spend more time on screens than this [4]. The Australian Institute of family studies conducted a survey in 2015, and calculated the percentage of children, which screen time more than two hours in all the interviewed families, and the average screen time (Figure 2.2). Nearly half of the children still spent more than two hours; on weekends, children of all ages spent more than two hours on the screen.

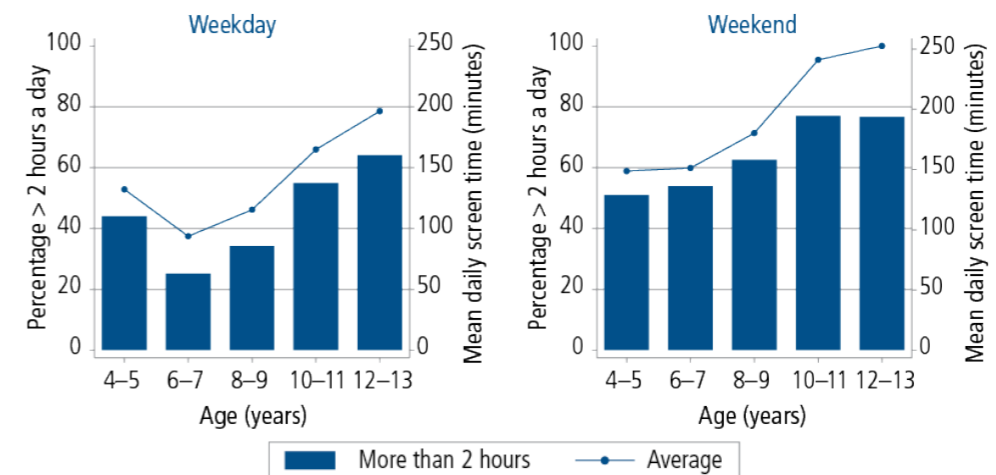


Fig 2.2. Children's total screen time on weekdays and weekend days, 4-5 to 12-13 years

Source: LSAC K cohort, TUD data Waves 1 to 5

This institute also counted two main forms of screen use by children of all ages at all times of the day: watching TV and playing games (Figure 2.3). Television viewing was the most common screen-based activity, with most children watching some television on weekdays and weekend days. Spending time using a computer was less common but increased with age. For some children, computer use was for playing games, perhaps supplementing playing games on other electronic devices. Also, and increasingly at 12-13 years, the computer was used for activities such as homework and social networking [5].

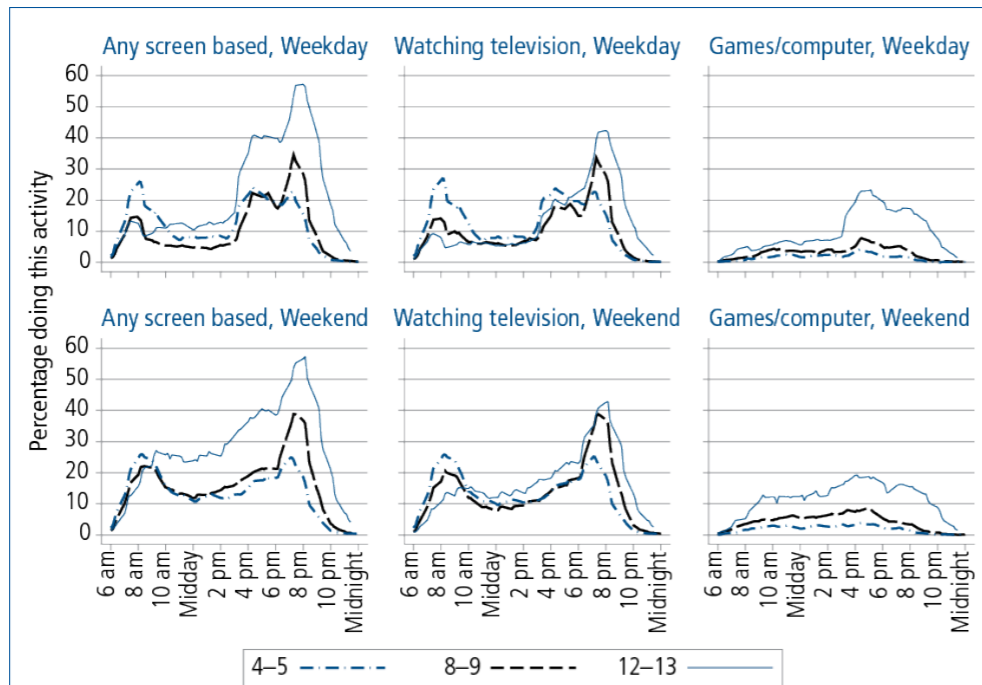


Fig 2.3. Children's screen-based activities over weekdays and weekend days, 4-5, 8-9 and 12-13 years

Note: The time use diary data were used to derive, for each 15-minute interval across the day, an indicator of whether or not children undertook this activity within that interval. This figure shows the percentage undertaking this activity within each 15-minute interval from 6am to midnight, for the ages of children indicated.

Jenny Radesky was the lead author of the 2016 American Academy of Pediatrics policy statement on digital media use in early childhood. Dr. Radesky is a Developmental Behavioral Pediatrician and Assistant Professor of Pediatrics at the University of Michigan Medical School. She believed that electronic devices have become an inevitable part of many children's lives, but research on the impact of electronic devices on children's development was limited. Studies have shown that some programs could really teach children over 3 years old, but the impact of programs on children under 3 years old was still unclear. Dr. Radesky also pointed out that electronic devices can help comfort children in aircraft, surgery and other occasions, parents should avoid using this method to comfort children, because frequently doing so will affect children's ability to control their emotions. Reasonable screen time is not a bad thing for children.

We cannot deny the significance of the development of digital technology shown in the screens. It does bring us a modern life and is helpful to children's growth education, but when most children use the screen for too much time, it has a negative impact on children's physical and mental health.

2.2. Children's physical health problems and intervention strategies

2.2.1. Children's sedentary behavior and obesity risks

In the past few decades, the physical activity of children and adolescents has been gradually decreasing, and the time of sedentary behavior has been increasing. At the same time, the obesity rate of children and adolescents and a series of diseases caused by obesity were increasing significantly [6]. Obesity is an important risk factor affecting children's health. Historically, a heavy child meant a healthy child, and the concept "bigger is better" was widely accepted. Today, this perception has drastically changed on the basis of evidence that obesity in childhood is associated with a wide range of serious health complications and an increased risk of premature illness and death later in life [7].

In 2010, 43 million children (35 million in developing countries) were estimated to be overweight and obese; 92 million were at risk of overweight [8]. The worldwide prevalence of childhood overweight and obesity increased from 4.2% (95% CI: 3.2%, 5.2%) in 1990 to 6.7% (95% CI: 5.6%, 7.7%) in 2010. This trend is expected to reach 9.1% (95% CI: 7.3%, 10.9%), or '60 million, in 2020 (Figure 2.4) [8].

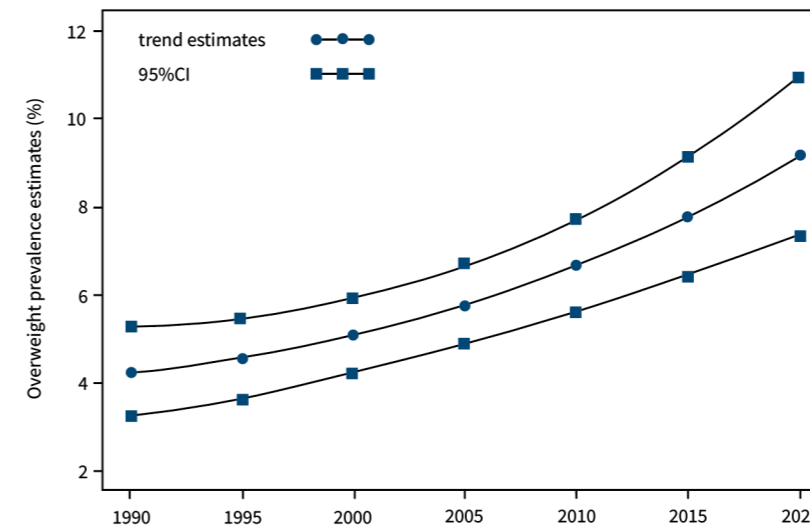


Fig 2.4. Global prevalence and trends of overweight and obesity among preschool children

The study [9] analyzed the differences in physical activity, sedentary behavior before screen, food intake and cardiovascular metabolic indexes between obese children and normal weight children. The results showed that obese children had less physical activity, more sedentary behavior time before screen and more fat intake. Obese children had higher total triglyceride, HOMA-IR score, C-reactive protein and lower HDL. After adjusting various factors, it was found that the sedentary behavior time before screen was positively correlated with HOMA-IR score and C-peptide level, which was statistically significant and independent of physical activity and carbohydrate and fat intake. Conclusion before screen sedentary behavior is an important independent risk factor for obesity and cardiovascular metabolism in adolescents.



Fig 2.5 & 2.6. Picture of guidelines on physical activity, sedentary behaviour and sleep from World Health Organization

Screen time, especially too much TV time, has become an important factor in obesity [10]. On the one hand, a large amount of screen time takes up the time of children's activities; on the other hand, screen time has a bad effect on sleep behavior. Research in young children and adults shows a strong, inverse relationship between sleep duration and risk for overweight and obesity [11]. Lack of sleep can affect the brain's nerve reflex, promote the body's appetite, and also can change the individual's diet behavior by regulating the level of human hormone, such as making the body tend to eat high-fat and high carbohydrate food.



Fig 2.7 & 2.8. Advertisement of McDonald's mobile App

In TV programs, posters on the roadside, all kinds of snacks and fast food advertisements impact the vision of contemporary children. Advertisements may change children's food choice and food intake by frequently exposing information about food to children, inducing food to eat and slow response to satiety when eating. According to the assessment of the Federal Trade Commission conference of the United States, children aged 2-11 years will watch approximately 25600 advertisements every year. Most of the food advertisements expose foods with high salt, high sugar, high fat and low nutrition [12], and children will watch about 11 kinds of food advertisements every additional hour of watching TV [13].

Whether children's exposure to junk food advertising will affect children's eating behavior? It has been proved that children who watch too much TV are more likely to choose the food in advertisements [14]. A large number of studies have shown that advertising affects children's food preference and choice. For example, children's excessive watching TV, excessive computer entertainment and excessive drinking of sweet drinks are positively correlated, but negatively correlated with the intake of fruits and vegetables [15].

Moreover, children who watch TV for a long time (more than 2 hours a day) are more likely to choose high-density food [16]. Children's behavior of watching TV for a long time also virtually increases the consumption of high-density food [17]. Over watching TV not only affects children's food choice, but also increases their food intake, especially for those preschool children who eat while watch. Scholars believe that screen time (over watching TV or playing computer) affects the signal transduction in children's satiety center, which leads to children overeating.

2.2.2. Physical activity recommended standards for children

Children's regular physical activity of appropriate intensity can enhance muscle, bone and cardiopulmonary functions, promote intellectual development, regulate the body's energy balance and reduce the risk of obesity. Increasing physical activity of infants and young children also helps to develop good exercise habits in their childhood, which is helpful for weight controlling.

The World Health Organization (WHO) recommends that infants under one year old should perform different forms of physical activities (such as doing baby exercises, playing interactive games with their parents, etc.) every day. For infants who are unable to act independently, they should include not less than 30 minutes of "Belly time" (stretching in prone position when awake). Children aged 1-2 years should have at least three hours of physical activity including moderate intensity and above every day. The limited time for infants under 2 years old (such as being restricted in prams, trolleys, high chairs, etc.) should not exceed 60 minutes [18].



During the worldwide outbreak of COVID-19 this year, some countries issued laws and regulations to require people to be isolated at home. But even if it is quarantined at home, we also need to maintain a certain amount of physical exercise. WHO recommended that all healthy adults do 30 minutes per day of physical activity, and children should be physically active 1 hour a day.

Fig 2.9. WHO recommendations for physical activity during COVID-19 outbreak

In 2007, under the leadership of Canadian Society for Exercise Physiology (CSEP), the steering committee of Physical Activity Measurement and Guidance (PAMG) focused on the current relationship between physical activity and health, and emphasized the importance of reducing sedentary behavior as well as physical activity. The World Health Organization's recommendation on global physical activity also pointed out the harm of sedentary behavior. In 2011, Canada released the first sedentary behavior guide for Canadian children and adolescents (Figure 2.10) [19].

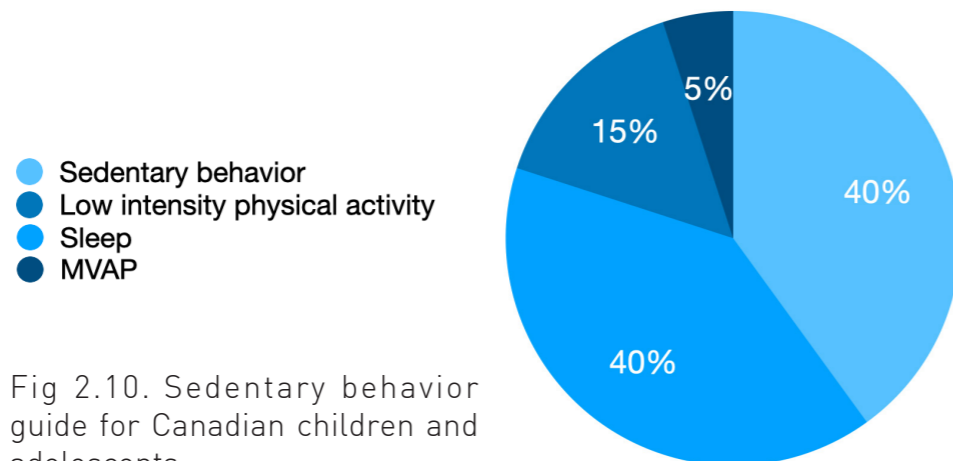


Fig 2.10. Sedentary behavior guide for Canadian children and adolescents

The Canadian government has released the world's first one-day activity guide for children of all ages, "Canadian 24-Hour Movement Guidelines for the Early Years (0-4 years)" and "Canadian 24-Hour Movement Guidelines for Children and Youth". This set of guidelines integrates health indicators of physical activity, sedentary behavior and sleep, attaches importance to the collection of evidence related to different types of physical activity, adopts the results of objective survey data as the basis, and pays attention to the authority and credibility of the communication process. The guidelines suggest that children and adolescents should not spend more than 2 hours playing on the screen every day. At the same time, they should accumulate more than 60 minutes of moderate to vigorous physical activity (MVPA) every day, and should carry out at least three days of intensive physical activity and three days of muscle and bone strengthening activities every week to ensure the health benefits of children and adolescents [20].

United States of America, Canada and China and other government agencies and organizations have proposed that children and adolescents should completed no less than 60 minutes MVPA every day. However, in China, only 29.9% of children and adolescents met the standard in 2006 [21]. According to Canadian health measurement data, only 36.0% of children and adolescents completed 60 minutes of MVPA a day [22].

2.2.3. Improving children's physical health and wellbeing

Children's physical health refers to the growth and development of all organs and tissues of children, without physiological defects, which can effectively resist various acute and chronic diseases. Children's physical growth and development, and the operation of their physiological systems are the premise of ensuring their health. Obvious physiological defects will inevitably lead to physiological disorders, such as organ defects or functional abnormalities, poor eyesight, anemia, respiratory tract infection and other abnormal diseases, as well as obesity, emaciation, physical growth deviation, etc. According to WHO, sedentary and inactivity are the primary independent risk factors of chronic non-communicable diseases and metabolic syndrome in children and adolescents.

First of all, for pre-school children, parents should assist children to establish routines and cultivate good habits, such as regular work and rest time, ensure children's adequate sleep time, and cultivate children's healthy living habits, so that children can understand that people's growth and health must rely on food, understand that the body needs a variety of nutrients, eat a variety of different foods, and

create a good diet education environment. Parents should also lead children to carry out sports activities, cultivate children's interest in sports activities, and make children develop good habits of regular sports [23].

	7-12 months	1-3 years	4-8 years	9-13 years	4-18 years
Protein	11g	13g	19g	34g	52g for boys 46g for girls

Fig 2.11. How much protein do kids need daily (Data from <https://feedingbytes.com/2017/06/child-getting-enough-protein/>)

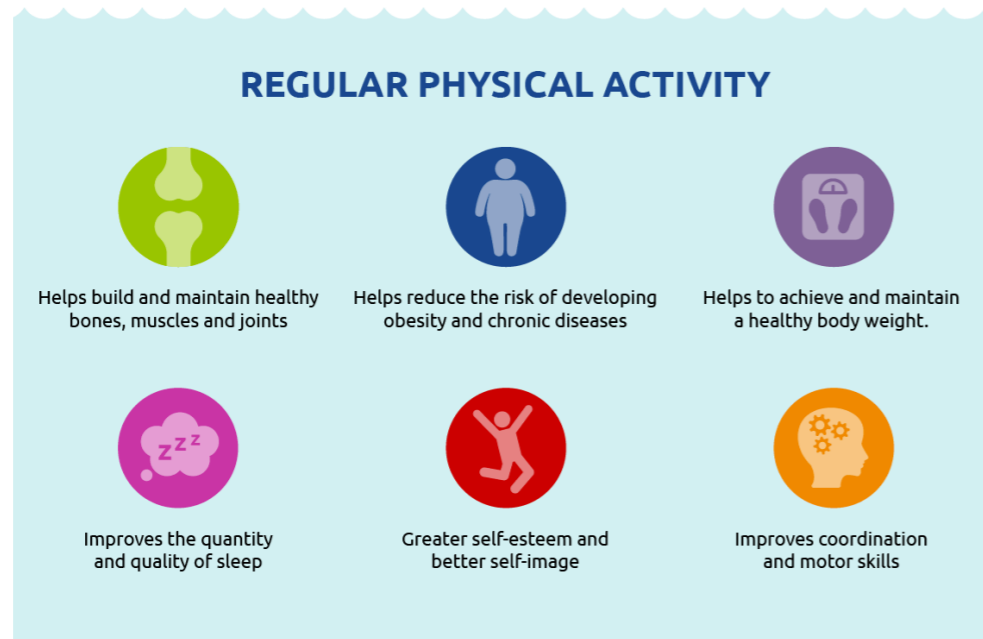


Fig 2.12. The benefits of exercise for children infographic
Source: <https://elearninginfographics.com/benefits-exercise-children-infographic/>

Although almost all schools and fast food restaurants such as McDonald's have provided activity areas for children, lack of exercise and sedentary behavior is still a common problem for children in their growth. In the process of children's growth, the intensity and density of children's exercise should be arranged reasonably. All kinds of smart phones and watches have the function of recording human movement, including step recording, sedentary reminding and heart rate statistics. Use modern technology is also a good way to promote children's sports. Children belong to the stage of poor self-control ability. Through parents or children's own settings, watch timing prompts to remind children when and what they should to do, change their bad living habits.

In order to increase children's sports time, there are also many commercial places help reducing the effect of such problems. Take bounce Inc. as an example, which has opened trampoline parks in many cities around the world (Figure 2.13 and 2.14), this activity center is mainly to provide rock climbing, dancing, ball games and other activities for children and teenagers. The company's official website also has a timetable for various sports courses. Parents and children can choose which to take according to their own needs and hobbies. Coaches manage all the activities, the whole trampoline park takes spring as the main basic action, increases children's exercise range and promotes children's physical coordination ability.



Fig 2.13 & 2.14. bounce Inc Italy branch
Source: <https://www.bounceinc.it>

2.3. Children's mental health issues and intervention strategies

2.3.1. Mental health problems

In 2010, a study by AS Page et al [24] provided evidence for psychological problems caused by behavior in front of screen. The study found that children who watched TV or used computers for more than 2 hours a day were at higher risk for psychological problems. If these children also fail to meet the standard of physical activity guidance, the risk will be increased.

Since 2010, American Center for Disease Control has found that the number of children aged 13 to 18 with depression was increasing. Clinical Psychological Science of the United States has carried out research on the harm of increasing screen time on children's mental health from television to mobile phone software to social media. After a survey of more than half a million children, researchers found that children who spent more time on media devices were also more likely to have mental health problems. Kate Eshleman, a children's psychology doctor of Cleveland Clinic, though not a member of this study, also said that there was a correlation between screen length and mental illness. The longer a media device was used, the less social and health activities users actually had.

Interpersonal communication and social interactions

In the health education of teenagers, it is very important to emphasize the communication and contact with parents and peers for teenagers' physical and mental health. We must pay attention to the influence of static behavior in front of screen on the interpersonal communication and physical and mental health of teenagers. Much attention has been paid to the relationship between long-term static behavior in front of screen and mental health of adolescents. Static behavior in front of screen causes psychological problems of children and adolescents, which is harmful to mental health.

Self-concept and Self-esteem

Children with physical health problems are more likely to have problems in mental health. Child with obesity has unusual psychology condition. They have a bad problem with self-esteem, self-image, and self-concept, and correlation with depression [25]. Therefore, the evaluation of life satisfaction of obese children is not high.

A previous project by the Foundation for People with Learning Disabilities analyzed data that had been collected by the Office for National Statistics (ONS) in 1999 in their survey of the mental health of children and adolescents in Great Britain. The Foundation found that in this nationally representative sample of just over 10,000

children, 39% of 5-15 year old British children with learning disabilities had a diagnosable mental health problem (compared to 8% among children who did not have learning disabilities).

2.3.2. Improving children's mental health

The risks of children's behavior problems include many factors such as biology, family environment, social psychology and so on. McGee R. pointed out in his study [26] that the key to maintain the mental health of children and adolescents is to have a good and healthy family psychological environment. Accordingly, the research results of Jensen PS [27] show that family is the main living environment for children, and children's behaviors are affected by the interaction between parents and children. Family environment, parents' cultural quality, parent-child relationship and parenting style will have a profound impact on children's psychology.

Parent-child relationship is the most basic and important relationship in a family. It is also the highest and longest lasting relationship among children in social contact and the most stable relationship in family relationship. In the process of children's growth, the parent-child relationship is gradually transformed from Parental restraint on children's behavior to the decision-making of both parents and children.

This is a transitional form of parental supervision and education. The significance of this adjustment about children's behavior is that the parent-child relationship gradually changes from one-way authority obedience to equal and mutual respect cooperation relationship [28]. And extreme regulation or doting children will cause bad effects on their mental health.

Children with congenital deficiency, children with cognitive or sensory problems, will be more difficult to communicate with others or learn knowledge in their growth. The society provides various special schools for them to create a good environment to protect their mental health and create a good environment for their comfortable growth. Tel Aviv elementary school (Figure 2.15, 2.16 and 2.17) in Tel Aviv, Israel is a public school caters to children with disabilities and learning difficulties. The goal is to translate the philosophy of inclusive education into a physical environment that promotes joyful experiential learning. In this school, the diversity of the student body, encourages interaction and different types of learning. This designed space inspires children to be engaged in multiple ways while enhancing a feeling of belonging and empathy. The calm colors and natural wooden materials were used to avoid emotional overload. The design is able to accommodate students in wheelchairs. Geometric nooks in the walls offer personal areas for relaxing and reading. There are also areas to learn yoga, Braille, sign language, etc. The



fig 2.15. Tel Aviv elementary school children recreational area



Fig 2.16. Tel Aviv elementary school braille and sign language learning area



Fig 2.17. Tel Aviv elementary school yoga room
 Source: <https://www.haaretz.com/israel-news/culture/.premium.MAGAZINE-inclusive-tel-aviv-school-is-what-21st-century-education-could-look-like-1.7804167>

whole space promotes personalized education and differentiating teaching methods.

It is widely acknowledged that the health benefits of participation in physical activities are not limited to physical health but also incorporate mental components [29]. Participation in sport for children and adolescence is associated with improved psychological and social health, above and beyond other forms of leisure-time physical activities. More specifically, there are reports that participation in team sports rather than individual activities is associated with better health [30]. Therefore, because of the long screen time on children, whether it is physical or psychological problems, physical activities are a good solution.

Quality experiences in sports can have beneficial emotional effects in terms of reduced negative affect and increased self-esteem [31]. For the psychological problems of obese children mentioned above, some studies [32] have shown that physical activity combined with nutrition education has a positive effect for life safety child obesity, so do with just physical activity. But only nutrition education has no effect.



Children physical activity spaces

Children physical activity space is a kind of place for children, parents or teachers to study, play exercise and work. An effective design of the environment plays a leading role in order to maximize the efficiency, making children enjoying the place more easily, improving. In the research of Children activities space, we should consider the influence of anthropometry, ergonomics, color, illumination and surrounding environment on children's psychology first.

3.1.Children ergonomics and safety in space design

Children are typically described by their age groups. For instance, when designing for children, we often differentiate between preschool and school-age children. However, childhood is a time of continual and rapid change in physical and psychological abilities [33]. When we buy children's furniture , the actual size of each piece of furniture is usually mentioned in the label, package or online description. Many furniture manufacturers also make recommendations on the children's age range for their designed furniture. Therefore, anthropometry of children according to age groups is the basis for selecting the dimension of indoor furniture and space design.

Children's body data of all ages are the basis of designing interior furniture and facilities size of children's activity space. According to disabled world website, the best body data table (Figure 3.1 and 3.2) for a healthy child in all ages is provided. In addition to basic data, the experience of dimension design of children's furniture also provides reference for the design of children's activity space, such as the essay [34] shows:

Table Height

The width, depth or diameter of a table vary greatly, based upon the number of children it is designed to comfortably seat at once. The height depends on the age range of the children. For toddlers up to 4 years old, the standard table height is 20 to 22 inches. For children age 5 to 7, a table 22 to 25 inches high is standard; 24 to 29 inches is typical for a table designed for 8- to 10-year-olds.

Chair Sizes

Chair height also varies based on the recommended age range of the children who may use it. There is no standard for chair back height, but the seat ranges from 10 to 12 inches off the ground for toddlers, 12 to 14 inches for children age 5 to 7, and 13 to 17 inches for children from 8 to 10 years old.

Male children - 2 to 12 years		
Age	Weight	Height
2 yrs	27.5 lb (12.5 kg)	86.8 cm
3 yrs	31.0 lb (14.0 kg)	95.2 cm
4 yrs	36.0 lb (16.3 kg)	102.3 cm
5 yrs	40.5 lb (18.4 kg)	109.2 cm
6 yrs	45.5 lb (20.6 kg)	115.5 cm
7 yrs	50.5 lb (22.9 kg)	121.9 cm
8 yrs	56.5 lb (25.6 kg)	128.0 cm
9 yrs	63.0 lb (28.6 kg)	133.3 cm
10 yrs	70.5 lb (32.0 kg)	138.4 cm
11 yrs	78.5 lb (35.6 kg)	143.5 cm
12 yrs	88.0 lb (39.9 kg)	149.1 cm

Male children - 2 to 12 years		
Age	Weight	Height
2 yrs	27.5 lb (12.5 kg)	86.8 cm
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6 yrs	45.5 lb (20.6 kg)	115.5 cm
7 yrs	50.5 lb (22.9 kg)	121.9 cm
8 yrs	56.5 lb (25.6 kg)	128.0 cm
9 yrs	63.0 lb (28.6 kg)	133.3 cm
10 yrs	70.5 lb (32.0 kg)	138.4 cm
11 yrs	78.5 lb (35.6 kg)	143.5 cm
12 yrs	88.0 lb (39.9 kg)	149.1 cm

Fig 3.1 & 3.2. Average height to weight of boys and girls
Source: <https://www.disabled-world.com/calculators-charts/height-weight-teens.php>

Exupery International School (Figure 3.3 and 3.4), in Pinki, Latvia is a school that can accommodate children aged two to sixteen, it boasts state-of-the-art education facilities, including twelve classrooms, five language-learning spaces, science labs, two computer rooms, sports halls, art studios and a music classroom. It units school and kindergarten in one complex, it comes with a new educational model directed towards the child and encouraging creativity.Both while designing the building and creating the concept of interior and furnishing, the main aim was that the children should feel themselves at home and free. Both the younger and the older students are the main in this house,different sizes of furniture were designed for the children. The buildings an interior are designed attractive but 'light', on the inhabitants of the house, so that it is convenient, comfortable and also interesting to study and work at International School Exupery.



Fig 3.3. Exupery International School's toilet is designed with different heights of hand washing sink



Fig 3.4. Exupery International School children leisure activity area
Source: https://www.archdaily.com/803016/exupery-international-school-8-am?ad_medium=gallery

3.2. Benefits of children activities accompanied by their parents

According to the 43rd statistical report on China Internet Development released by China Internet Network Information Center (CNNIC), as of December 2018, the number of Internet users in China was 829 million, and the proportion of Internet users using mobile phones increased from 97.5% at the end of 2017 to 98.6% at the end of 2018. The popularity of mobile network has gradually changed people's life style, but the problems caused by being addicted to mobile phones are becoming increasingly prominent. In the virtual network era, face-to-face communication is becoming less and less. Some parents are addicted to mobile phones and neglect the communication with their children. The parent-child relationship is becoming more and more delicate.

Infants are wired to look at parents' faces to try to understand their world, and if those faces are blank and unresponsive – as they often are when absorbed in a device – it can be extremely disconcerting for the children [35].

The study [36] results showed that: mobile phone addiction, intimacy parent-child relationship and conflict parent-child relationship had significant differences in occupational and cultural level variables, and most of the children's parents' mobile phone addiction tendency was in the middle level, and mobile phone addiction was positively correlated with conflict parent-child relationship, negatively correlated with intimacy parent-child relationship, but not dependent parent-child relationship significant impact. Therefore, it is suggested that children's parents should use mobile phones appropriately, set up correct family values, play an exemplary role, build a good parent-child relationship, return to real life and pursue the truth of life.

Radesky, assistant professor of Pediatrics at the University of Michigan, said "Parents don't have to be exquisitely present at all times, but there needs to be a balance and parents need to be responsive and sensitive to a child's verbal or nonverbal expressions of an emotional need."

Accompanied by parents in extracurricular time have moderating effect on mental health of teenagers. Excessive outdoor sports activities may lead to the increase of physical conflicts, which may easily lead to adolescent behavior problems (such as fighting and other violent behaviors). However, if these activities are accompanied by parents, conflicts will be effectively reduced, and on the contrary, it makes teenagers get exercise and promote their physical and mental pleasure; Although sedentary and sedentary leisure activities can also lead to adolescents' externalizing behavior problems, if accompanied by their parents, they can effectively supervise teenagers' excessive use of Internet or TV, so that these activities can reduce the learning pressure of teenagers and promote their mental and physical health development [37].

Play, as a significant factor in the parent-child interaction, represents a way of preparing the child by the parent for he adult lifestyle, an anticipative exercise, an essential process necessary in building the parent-child relationship, in approaching and gaining mutual trust. Play is essential in the efficient disciplining of the child, as well as in his/her education in the spirit of moral and esthetical values; The good interaction in a family represents the suitable climate and atmosphere for the family, the affective dynamics of a positive nature, the presence of affective support and the lack of scandal, of the hostility between parents and acts of violence. This interaction positively influences the state and behavior of the child and participates in the child's development and normal upbringing, both physical and psychological; The harmonious development of the child is the result of a good interaction between family members. This offers the child the possibility of defining oneself, of finding models and, furthermore, offers a suitable position in the social universe [38].

3.3. learning through play

Play is often defined as activity done for its own sake, characterized by means rather than ends (the process is more important than any end point or goal), flexibility (objects are put in new combinations or roles are acted out in new ways), and positive affect (children often smile, laugh, and say they enjoy it). These criteria contrast play with exploration (focused investigation as a child gets more familiar with a new toy or environment, that may then lead into play), work (which has a definite goal), and games (more organized activities in which there is some goal, typically winning the game) [39].

Mitchel Resnick, professor of Massachusetts Institute of Technology, and President Chen Jining of Tsinghua University once met at LEGO toy company in Denmark. They think that children learn in two ways: one is to receive traditional education, and they keep this learning habit from primary school to high school to university, this kind of students knew the theory, they knew how to solve math problems, but they didn't have the ability to think creatively; the other is willing to take risks, dare to try new things and be eager to ask their own questions. Students with creative ideas and directions can create multiple possibilities with the same elements just like playing with LEGO blocks. In China, there is a lack of the second kind of students. They are looking for a new way of education and learning, developing new technologies and carrying out new activities to attract creative learning.

Professor Resnick and Tsinghua University are committed to the spread of the concept of "game learning". He puts forward the theory of creative learning spiral (Figure 3.5) and the "four P"(Figure 3.6) theories of creative learning [40].



Fig 3.5. Creative learning spiral by Mitchel Resnick

Let learning be like playing with blocks. First imagine the building you want to build, turn the idea into action, create buildings and stories, constantly modify and rebuild, try to build higher and larger buildings, add new story plots, share ideas with others, and have others' advice get new development. If the building falls down, you should think about how to build a more stable building. Then, you got a new idea for the next step.

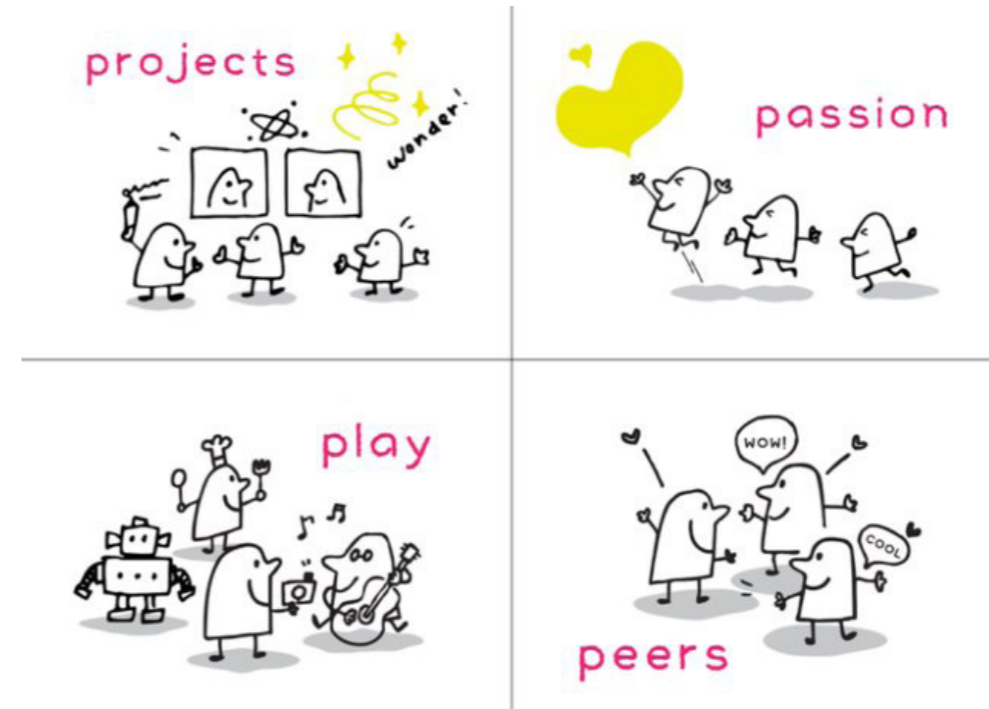


Fig 3.6. Projects, Passion, Peers and Play by Mitchel Resnick

Resnick explains how creating "projects" is essential for the Creative Learning Spiral and highlights some of the examples in the Scratch community where users create projects constantly that help them develop their skills and creativity. As Jean Piaget said: "Children learn best when they are actively engaged in constructing something that has personal meaning to them", that is why "passion" is fundamental for the creative process. People are willing to spend more time and work harder when they are committed to the project they care about. "Peers" refers to the collaboration and sharing of projects with others. As Resnick states: "Creativity is a social process". Finally, the last core is "Play". Playful experimentation is key in order to successfully thrive in the creative process [41].

Besides brain development, play also plays an important role in learning physiological skills. Locomotor play, including exercise play (running, climbing, etc.), involves large body activity and is generally thought to support physical training of muscles, for strength, endurance, and skill. Exercise play increases from toddlers to preschool and peaks at early primary school ages, when the neural and muscular basis of physical coordination and healthy growth is important, and vigorous play obviously provides good opportunities for this[42]; later, it declines. There is evidence that active, playground-type breaks can help young children concentrate better at subsequent sedentary tasks,[43] consistent with the cognitive immaturity hypothesis that the "need to exercise helps young children to space out cognitive demands for which they have less mature capacities." [43]

3.4. Influence of environment color

Winston Churchill once said “We shape our buildings, thereafter they shape us”. Environmental factors play an essential role in the nutrition, growth, development and education of children. Each and every characteristic of their physical environment contributes to their education and development. Although residential location, design, order, plan, colors as well as the areas of play may contribute to a child’s learning, these same factors may also hinder the revelation of their potential.

In interior design, color has the most powerful, affective and the most mysterious influence [45]. Color could affect the psychological reactions as well as the physiologic health of children. Colors affect the bodily functions, mind and emotions with the energy produced by light. Studies conducted clearly demonstrate the benefits of colors where the development of the brain, creativity, productivity and learning are concerned. The effects of color on human beings can be varied; causing excitement, lending calm, giving inspiration, raising anxiety or tension or giving peace are some of these effects. These effects can be observed more distinctly in children. Children can be more sensitive to colors [46].

With the growth of age, there will be great differences in their understanding of color. Generally speaking, the process of children’s cognition of color is to recognize color first, then to know the hue, name and temperature of color, and finally make a choice according to their own preferences. Good looking and harmonious colors would make people feel comfortable (already written) while messy and fuzzy colors would make people feel tired and affect their emotions. If children live in this environment for a long time, their intelligence and health will be affected. Colors which are too strong could stimulate children’s visual nerve and affect their eyesight, colors which are too bright could make children become restless, causing boredom, colors which are too rigid is not conducive to children’s aesthetic training. Therefore, when choosing and equipping colors for children’s living environment, we should start from children’s psychology, make color adapt to children’s healthy development, and control brightness and intensity, so as to create harmonious and comfortable color environment for children.

NUBO kindergarten (figure 3.7, 3.8 and 3.9) in Sydney was conceived and designed by frost*collective and paldesign architects, this unique concept in children’s play spaces is the first of its kind in Australia. Spread across a 768 square meter space, the aim of the interior is to immediately instill a clean, carefully considered and aesthetically pleasing space for both the parents and children. ‘the aim of NUBO is to steer away from the typical play centre clichés of bright colours, plastic toys and computer screens.’ comments NUBO’s chief

imagination officer. Nubo is strikingly different to the highly colourful and overstimulating children’s playgrounds. Instead, the minimalist approach to colour (white, blue, light grey and brown), low-maintenance materials (rubber, laminate and timber) and equipment and structures (just enough for children to invent their own games) have created a visually subdued environment that is overlaid with the noise and energy of children.



Fig 3.7. NUBO children play space
Source: <https://www.nubo.com.au>



Fig 3.8. NUBO cafe rest area
Source: <https://www.nubo.com.au>



Fig 3.9. NUBO interior wall design
 Source: <https://www.archdaily.com/872595/nubo-pal-design>

The study [47] shows that all children were able to verbally express an emotional response to each color. Children had positive reactions to bright colors (e.g., pink, blue, red) and negative emotions for dark colors (e.g., brown, black, gray). Children's emotional reactions to bright colors became increasingly positive with age, and girls in particular showed a preference for brighter colors and a dislike for darker colors. Boys were more likely than girls were to have positive emotional associations with dark colors. Potential sources for children's color-emotion concepts, such as gender-related and idiosyncratic experiences, are discussed.

Colors are part of our language and our culture, and they are a big part of what we learn. In addition, they help determine how we learn. Not only do colors send signals to the brain to make us hungry or calm, but they also have the power to distract a child or enhance a child's learning potential. Lego house (Figure 3.10 and 3.11) in Billund, Denmark, was designed in consideration of this feature of color. There are a number of skills you develop in LEGO House depending on which color zone you play in. The Yellow Zone (Figure 3.12) is where you can really express yourself with bricks, which develops emotional skills. In the Blue Zone (Figure 3.13), you work with your cognitive skills by solving problems and handle challenges. The figures, universes and the stories in the Green Zone (Figure 3.14) stimulate your social skills and your creative skills are put to work in the Red Zone (Figure 3.15), where you can build creatively on a big scale with bricks. Finally, your physical skills are developed.

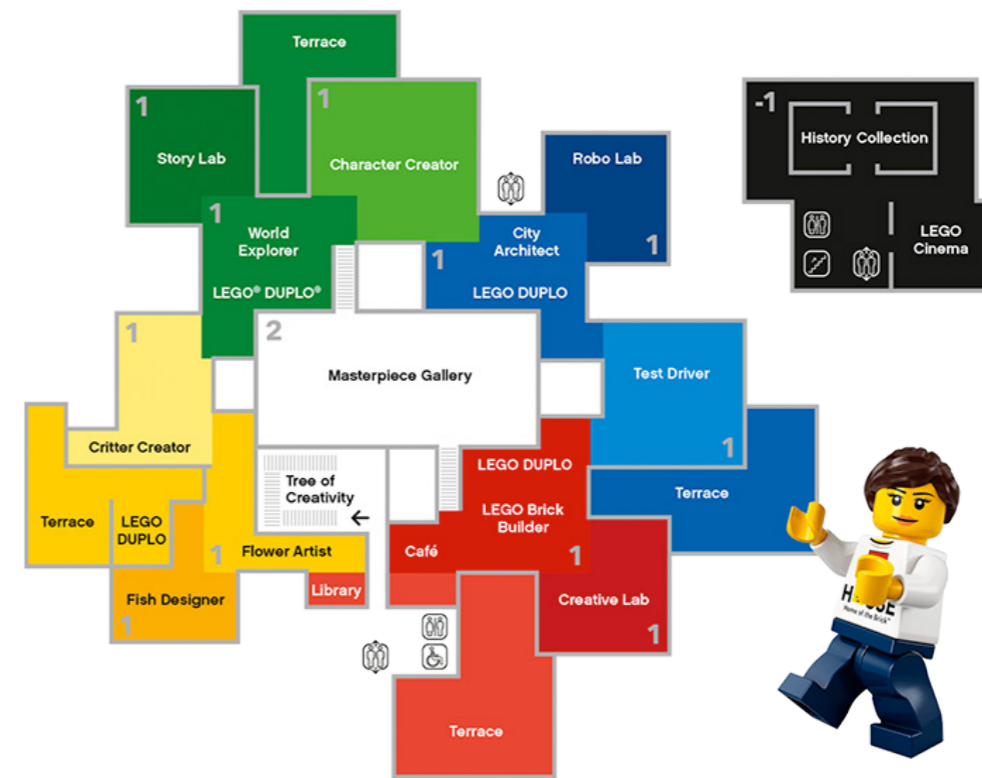


Fig 3.10. The first floor color functional plan of LEGO House
 Source: <https://legolandbillundresort.com/en/the-major-attractions/lego-house#/>



Fig 3.11. The ground floor color plan of LEGO House
 Source: <https://www.archdaily.com/880900/lego-house-big/59d39f22b22e38efb1000109-lego-house-big-ground-floor-plan>



Fig 3.12. Yellow zone of LEGO House



Fig 3.14. Green zone of LEGO House



Fig 3.13. Blue zone of LEGO House



Fig 3.15. Red zone of LEGO House
Source: <https://www.archdaily.com/880900/lego-house-big>

4

The children and parents' experience of children activity space

This chapter collects experience from the existing children's activity spaces in the market, so as to understand the ideal physical activity spaces for parents and children. I visited inkids with linefriends in Beijing, which is a very creative place for children's activities. I interviewed 30 parents there, they helped me complete the questionnaire survey and I summarized the relevant data in the end. I conducted an online questionnaire survey on 50 parents as well. According to the data from these two surveys, the market demand was analyzed and the design of children activity spaces in the future could be summarized and improved.

4.1. Field research on children physical activity spaces

—Take inkids with linefriends in Beijing as an example

Project name: inKids with Linefriends in Beijing
Area: 880 square-metre (approx. 9,500 sq.ft)
Location: Beijing Yintai Centre (in 01) luxury shopping mall, Chaoyang district, Beijing, China
Operator: Beijing Yusheng Yintai Business Management Co.Ltd, and Line Friends Images of Korea
Designer: Design department, Beijing Yusheng Yintai Business Management Co.Ltd
Finished Time: July, 2016

InKids with Linefriends Playground focus on sports and parenting, The developer's design department worked with Linefriends Images with a forest and ocean theme with the focus on the concept of "enjoying the world under your feet." Under the children's feet are suspended nets, curving staircases and slides, padded fabric puddles, bouncing pads, climbing hills, ball lakes and soft and hard floor surfaces. The colour white, natural wood and softly curving forms calm the space down and allow the Linefriends' characters to stand out.



Fig 4.1. Main entrance of inKids with linefriends

In the publicity, the company highlighted the important factor of safety. For example, all the sponge wrapped stairs and columns was cleaned up every day, and the air purifier was used; The floor of children's activity area is almost covered with cushions (Figure 4.3); During the decoration, the safe, non-toxic and harmless environmental water paint was used, which conformed to the Chinese children's space use standard. Under the premise of ensuring children's safety, various children's activities were hosted, it was also the first step for parents to rest assured.



Fig 4.2. Decoration of linefriends character



Fig 4.3. The floor of children's activity area covered with cushions

4.1.1. Distribution of children physical activity spaces in Chaoyang district of Beijing and highlights of inKids with linefriends

There are more than 200 indoor and outdoor physical activity places for children in Chaoyang District (figure 4.4), including children's dance education institution, children's personal trainer gym, physical fitness stadium, children's swimming pool and children's playground, etc (the above data comes from <https://www.dianping.com>). Such a high degree of intensity of locations and wide range of function, it shows that parents in Beijing attach great importance to children's physical health.

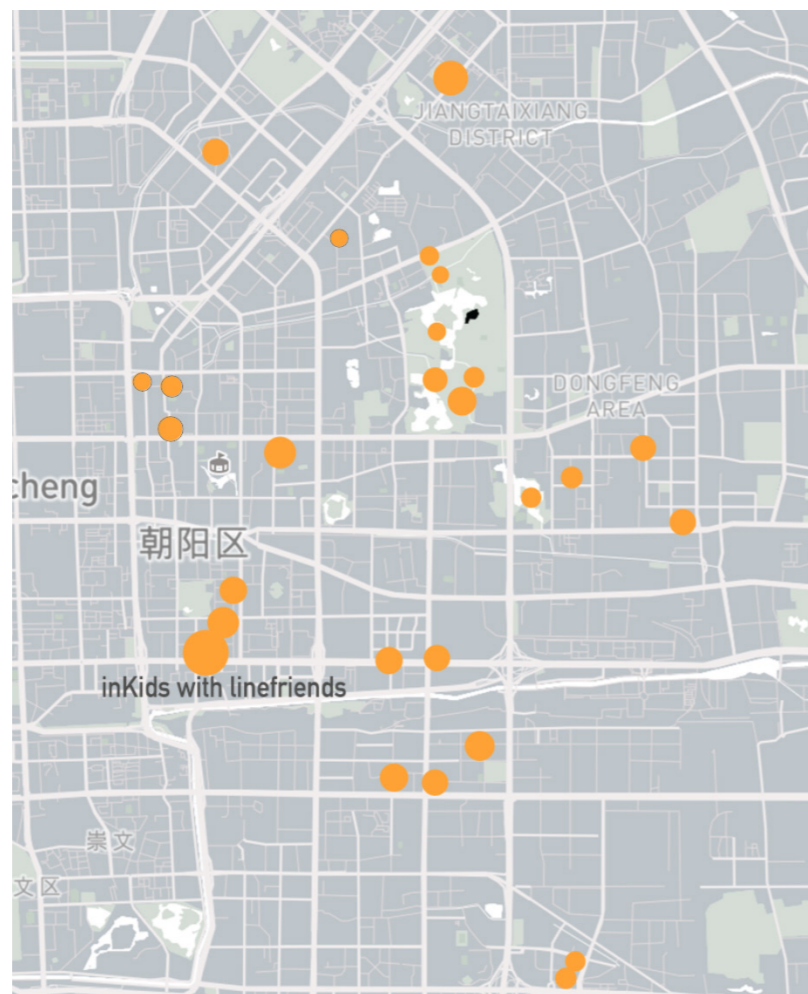


Fig 4.4. Sketchy distribution of children physical activity spaces in Chaoyang District

Inkids with linefriends was selected as a must go place for parents and children in Beijing in 2019, and ranked second among the most popular places for children's physical activity space in Chaoyang District. Among many such places, the popularity of inkids with linefriends is so high. On the one hand, its creative interior space not only attracts consumers aesthetically, but also has social attributes.

On the one hand, inKids with linefriends got the honor as the Popular Choice Winner from Architizer A+AWARDS. Its design inspiration comes from the bouncing curve of the ball. The designer will play the arch and curve to each area of the space (Figure 4.5), combine the inspiration and theme closely and delicately, highlight the humanistic concept of green environmental protection, and return children the nature. Designers hope that the whole space is clean, tidy and full of happiness. Therefore, in terms of color matching, a large area of white is used to create public space, avoiding the common colourful children's activity space with high saturation. Instead, rich colors are integrated into the space, and a complete whole is created through the change and intersection of colors.



Fig 4.5. The whole space of inKids with linefriends is full of curve

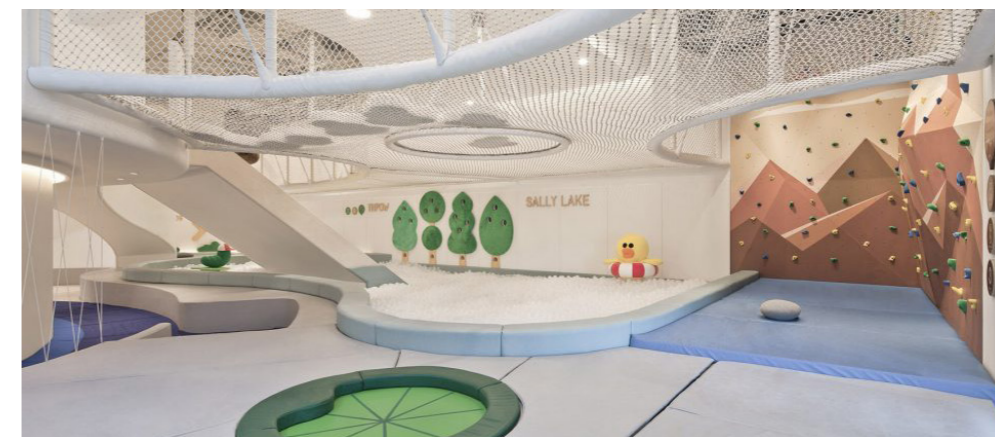


Fig 4.6. Scenes with natural elements

On the other hand, on almost all kinds of social applications in China, plenty of mothers are willing to share their children's growing process (Figure 4.7). As a children's paradise in Beijing's high-end shopping malls, kids with linefriends has become an online hot topic in Beijing's mom circle for its creative indoor space and clean atmosphere. Even many stars bought their children here to hang out with, almost every scene in this park is quite beautiful to take pictures. Most parents bought their children with them because they saw the pictures taken by others in the social applications. For inkids, the strong social environment brings them free publicity.



42 143 440

Fig 4.7. A mother shared moments that played with her daughter at inKids with linefriends

4.1.2.Feedback from inKids with Linefriends in Beijing

InKids with linefriends in Beijing consists of three parts in space, one of which was a free rest area designed in the form of outdoor tents with cartoon images of line friends, parents and children could rest and take photos freely. The second part was the leisure coffee area (Figure 4.8), where coffee and milk tea were provided. The rest area and coffee area are in the same space. They were distributed on both sides of the escalator with the park area, accounting for 20 percent of the total area. The third part was the largest recreation area which was composed of retail stores and park. In terms of the construction of the park, the forms provided by in kids were still relatively mainstream, mainly including "ocean ball", trampoline and rock climbing, which were deeply loved by children.

In addition to the amusement facilities of the park, in kids also has retail spaces and birthday party services. Party services are provided for birthday babies, enterprises holding parent-child activities and young girls with social needs. In kids has set up a party room (Figure 4.10) specially, the team creates a party atmosphere by setting the scene and some western style meals. In addition, inkids also holds "small classes" every week, where parents and children can participate in a series of classroom education such as handicrafts, painting, reading picture books, etc.



Fig 4.8. Coffee ares



Fig 4.10. Party room

Zhu Yueran, the general manager said, "we will constantly update the contents. The courses will be different every week and every month. We hope children and parents have fun and learn something during the process together, instead of just taking pictures, playing with slides, ocean balls, other projects and then leave right away. At present, the feedback from parents is pretty good.

During the site investigation, I interviewed children and parents separately with questionnaire (Figure 4.8) and got feedback from interest, satisfaction and harvest.

InKids with Linefriends 儿童乐园(北京)用户反馈问卷调查

儿童基本档案

性别: 年龄: 身高: 体重:

为什么选择来这个活动中心:

- A. 设施先进 B. 想来拍照 C. 功能齐全 D. 孩子要求来

孩子最喜欢的是哪个区域:

- A. 活动区 B. 空中游乐网 C. 派对室 D. 休息区域及商店

孩子觉得这个空间对于自身最有意义的事情:

- A. 结识新的朋友 B. 活动身体 C. 和家长相处 D. 学习运动技能

孩子的体验满意程度:

- A. 非常满意 B. 满意 C. 有待完善 D. 没有兴趣

家长最满意的是哪个区域:

- A. 活动区 B. 空中游乐网 C. 派对室 D. 休息区域及商店

家长觉得这个场所对孩子成长的哪个方面有利:

- A. 动手能力 B. 动脑能力 C. 身心健康 D. 创造力

家长对于场所在氛围和活动项目上的满意程度:

- A. 非常满意 B. 满意 C. 有待完善 D. 没有兴趣

如果有类似对场所,有专人陪伴儿童活动,不需要家长陪同,家长孩子的看法:

觉得该场所的优缺点有哪些,以后是否还会再来这里:

Fig 4.8. Chinese version questionnaire of the feedback

InKids with Linefriends Children's Park (Beijing) User Feedback Questionnaire

Basic information about children

Gender: Age: Height: Weight:

Why you choose this activity center?

- A. Advanced equipment B. For photos C. Complete functions D. Kid's choice

Which is your child's favorite area:

- A. Activity area B. Net playground C. Party room D. Rest areas and shops

Which is most meaningful to children about this place:

- A. Make new friends B. Physical exercise C. Get along with parents
D. Learning skills

Your child's experience satisfaction:

- A. Very satisfied B. Satisfied C. To be improved D. Not interested.

Parents' satisfaction with the venue's atmosphere and events:

- A. Very satisfied B. Satisfied C. To be improved D. Not interested.

Parents feel that the site is good for what aspects of their child's growth:

- A. Hands-on ability B. Brain power C. Mind and Body Health D. Creativity





If there is a similar place with a professional staff will accompany the children to do activities, children are not necessary to be accompanied by parents, what is your opinion?

What are the advantages and disadvantages of the site?

Fig 4.9. Chinese version questionnaire of the feedback

Results of questionnaire survey

The average age of children: 6 years old
 The average height of children: 110 cm
 The average weight of children: 19 kg

-  Advanced equipment
-  For photos
-  Complete functions
-  Kid's choice

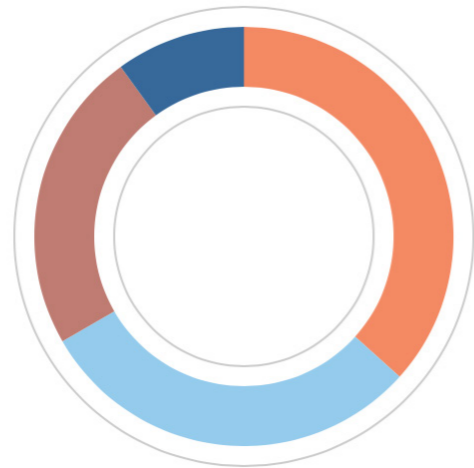






Fig 4.10. The reason of choose inKids with linefriends

A parent said that "we want to provide the best for our children, and this place has the best equipment in the children's playground nearby". However, the social software has attracted many parents to come and take photos. They share their parent-child moments in such a space.

-  Activity area
-  Net playground
-  Party room
-  Rest areas and shops

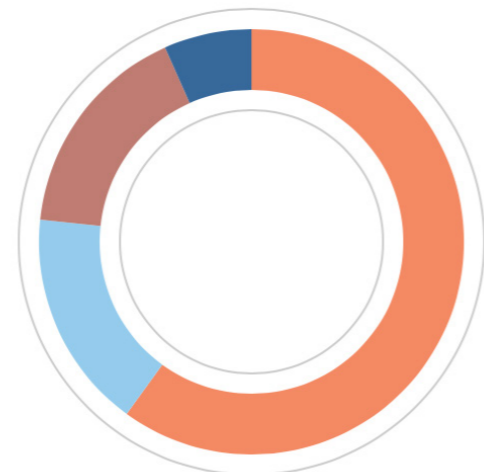






Fig 4.11. Children favorite area

As parents bring their children here for activities, the activity area is the most popular area in the whole space.

-  Make new friends
-  Physical exercise
-  Get along with parents
-  Learning skills

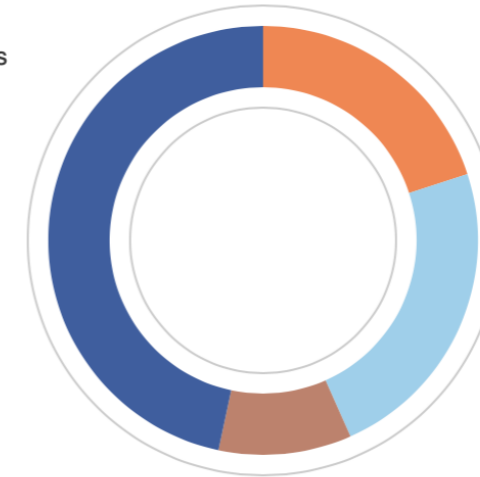


Fig 4.12. The most meaningful thing for children about this place

Children are in the stage of growth, and need to constantly learn life skills. In Kids with line friends, children can get in touch with new things and some lessons, in order to learn new life skills. Getting along with peers, making new friends and physical exercising are also the most important significance for children to play in this space.

-  Very satisfied
-  Satisfied
-  To be improved
-  Not interested

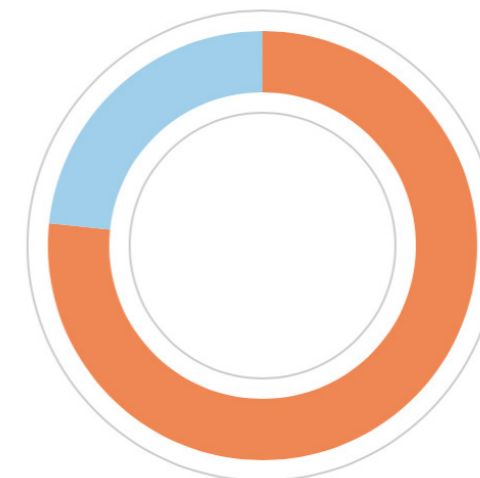


Fig 4.13. Children satisfaction survey results

Children said that they have a good time here. For children, happiness is the most important thing. Children will express their preferences in the simplest way. All of respondents are satisfied with inKids with linefriends. They have gained growth and happiness in it.

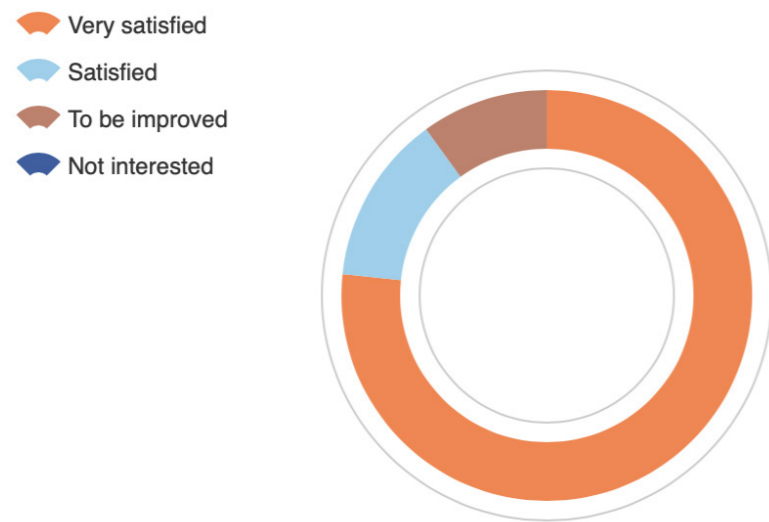


Fig 4.14. Parents satisfaction survey results

Most parents are satisfied with inKids with linefriends, but some parents also put forward some suggestions for improvement.

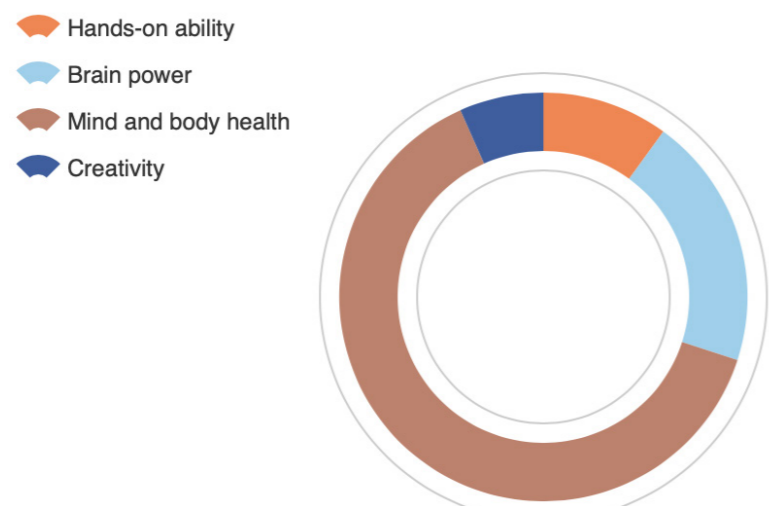


Fig 4.15. The benefits that parents consider this place providing for children

For this physical activity space, parents generally believe that it is beneficial to children's physical and mental health.

The answer of 'If there is a similar place with a professional staff will accompany the children to do activities, children are not necessary to be accompanied by parents, what is your opinion?' Some parents said that they hope to accompany with their children so that they can make sure that their children is safe. However, it is a good choice for professional coaches to help their children carry out physical activities. Just like the personal coaches of adults in the gym, they can avoid wrong move. The other parents also say that they are willing to give their children a coach so that they can do their own staffs.

For the comments on inKids with linefriends, parents think that it can provide a place for children to exercise, and it also includes many courses, children can really learn skills in it. The overall environment looks very comfortable and clean. The user age of net bed area is divided, which looks very safe, In order to let the children play in it. There are also some suggestions from parents, a mother said 'I hope that some special meals for children can be provided to the coffee shop.' Some children will fight over toys, but no staff is responsible for this, maybe they can hire some more staffs to take care of these children.

4.2. Online survey about design a children activity space

In order to deepen my research, I conducted an online questionnaire survey based on the survey of 60 parents whose children are under 18 years old. 29 of their children are girls, and 31 are boys. Among them, there are 22 children in the toddler stage, 26 young children and 12 teenagers. I collected the experience and suggestions of taking their children to the physical activity places, and summarized the data for analysis.

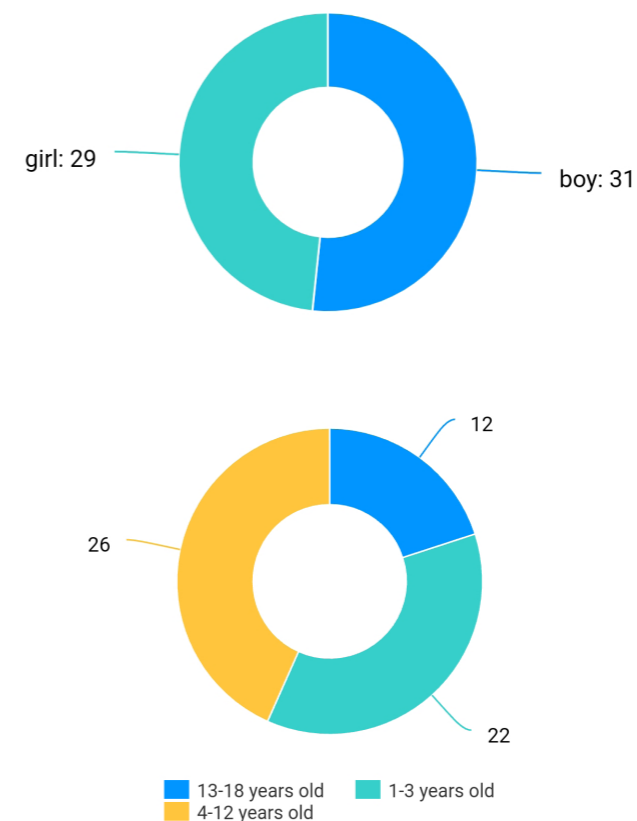


Fig 4.16 & 4.17. Gender and age of children surveyed

According to the statistical data collected (Figure 4.19), almost 70% of parents think that safety and interest are the most important factors of children's activity spaces. Safety as a basic element of architecture, and children should pay more attention to safety because of their limited cognitive ability and life skills. In order to keep children safe in these spaces, more details should be added to avoid unnecessary risks. Interest brings happiness, imagination and creativity to children, which helps children's brain development and mental health. In this space, parents are not experiencers but guardians of children. There are few parents to choose about the variety of activities, enough space and with learning space.

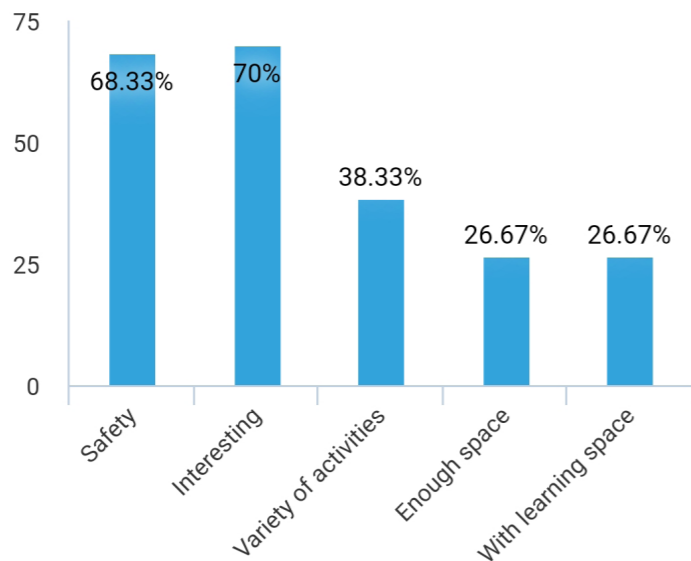


Fig 4.18. Percentage of the most important factors in children activity space

63% of parents think that the interaction space (parent-child interaction) is very important as a functional component of children activity spaces, which is a space for parents to interact with their children and parents accompany their children to play and promote parent-child relationship. As mentioned above, parents spend a lot of time on mobile phones and their work. This kind of space for parent-child interaction provides a space to make up for this phenomenon. The explore space (sports) and communication space (sharing) are close to the general choice of parents. The exploration space is a space for children to play and make continuous progress in various skills. The communication space provides a place for children to chat with their peers and share the experiences, which is consistent "play" and "share" in the "creative learning spiral". Learning space (reading), service space (catering) and exhibition space (aesthetics) have a low attention.

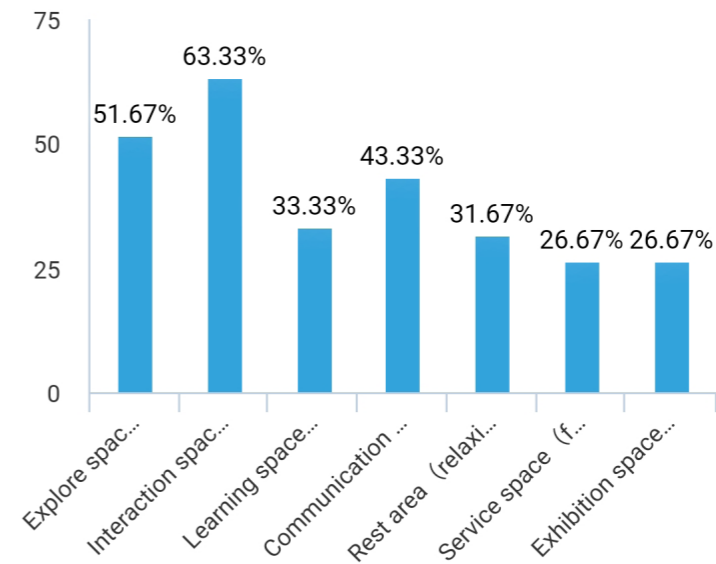


Fig 4.19. Percentage of functions preference in children activity space

Only more than half of the 60 parents interviewed, there is a children activity space near their residences. This also causes inconvenience to the other parents. They need to take their children to professional places far away from home for activities. The community needs to be improved, more space created for children's activities will bring convenience to all families.

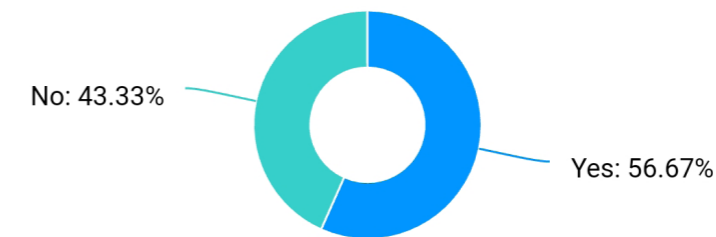


Fig 4.20. Percentage of children activity spaces near their residences

Nearly half of the children think that "climbing wall", "planting" and "slide" are the most interesting facilities. "Climbing wall" represents the spirit of exploration and upward. "Planting" is a rare activity in children activity spaces. Nowadays, children living in the city are lack of this kind of experience. Children are curious about this activity and can learn more skills through planting. The rest options are "wall hole", "seesaw" and "trampoline", "wall hole" is a small semi enclosed space, which represents the space belonging to the children their own. Slide, Seesaw and trampoline are the most common facilities in traditional children's paradise.

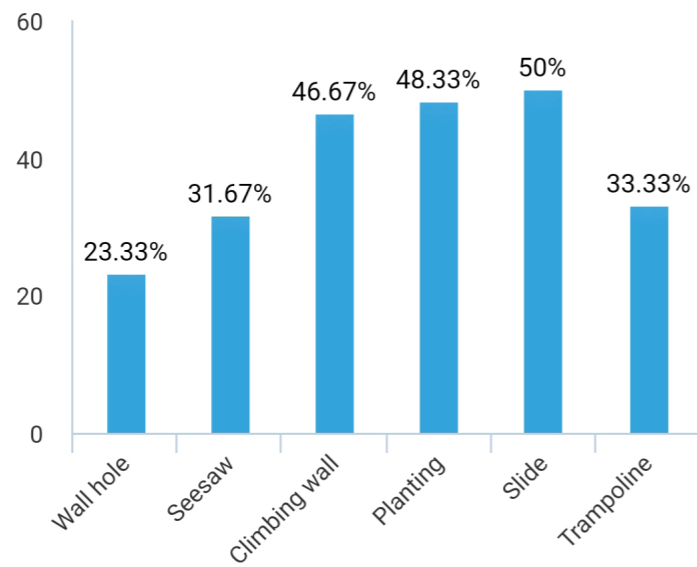


Fig 4.21. Percentage of children favorite facilities

Only 23.33% of children go to the activity spaces (including indoor and outdoor) less frequently, 61.67% of them go to activity space 2-5 times a week, 15% of them can do more than 6 times a week. According to this data, most families attach importance to children's physical activities, and parents are willing to take their children to public children's activity space.

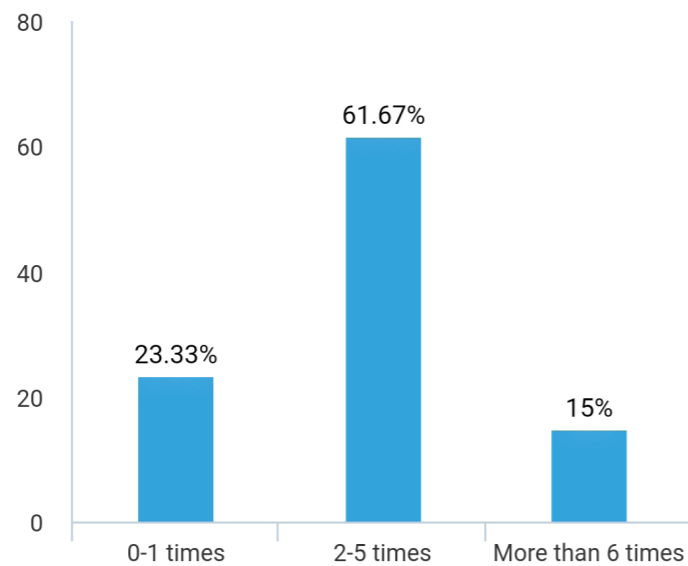


Fig 4.22. Percentage of frequency that children go to activity spaces each week

Half of the parents chose to add a special waiting area for parents in the proposal of children's activity space, and about 40% of parents also hope to add more activity equipments and professional staff to take care of their children. Only 30% of parents choose the spaces need to be expanded, no matter how large the site is, children can get a good experience in it is the most important thing.

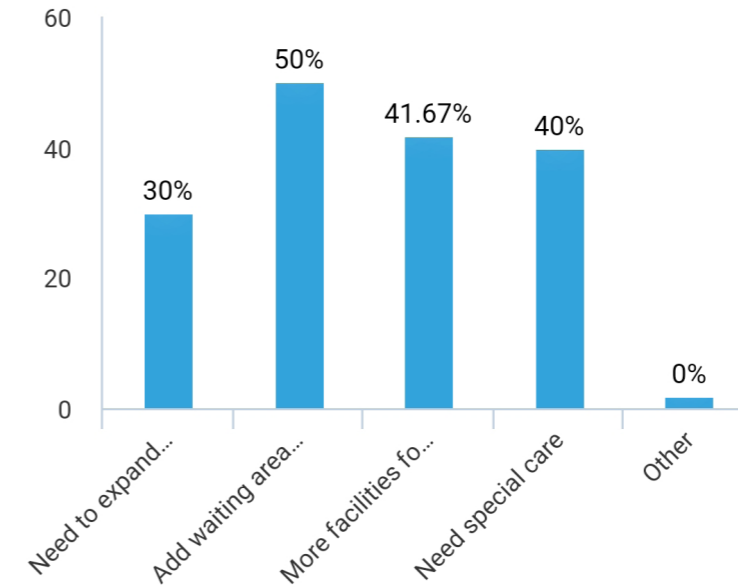


Fig 4.23. Percentage of suggestions on children activity space

In terms of the suggestions about atmosphere design of the space, the most voted option is "pure". Pure space visually can give users a clean and natural feeling. The "streamline and soft" has been chosen after "pure" is to provide children with a comfortable and safe space without sharp edges. Only 36.67% of the parents voted "colorful", which is the traditional atmosphere of children's paradise.

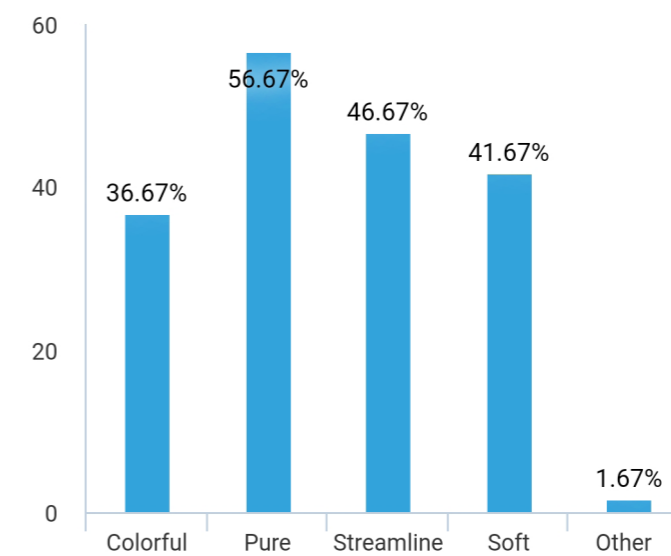


Fig 4.24. Percentage of suggestions on space design of children activity space

4.3. Reflection on creative activity space for children

Through the feedback of these two surveys, I hope that the ideals of all users could be realized in the future in children's activity space. The objects of the survey are parents and children, they have different perspectives on problems. Children are more likely to be participants in the activity space and served objects in all functional areas, parents usually act as companions, watching and accompanying their children to have fun together. The purpose of the research is to improve the experiences of parents and children.

In terms of the functionality of children's activity space, parents' suggestions mainly focused on special care, catering service, parent-child interaction space and waiting space for parents. Many parents hoped that professional staff should be particularly responsible for the care and management of children in children's activity space, so as to avoid children's quarrel and snatching toys, it is a better way to organize children to carry out physical activities as well. Catering service should provide children with specific nutritious meals to supplement energy. Parents and children interaction space and parents waiting space should be considerable for parents who would like to participate in, and hoped that the space planning would take into account the parent factor, reserve space for parents. There is a good parent-child interaction space in inKids with linefriends (Figure 4.25), which is a children's simulated kitchen space. Parents can use mini kitchenware to teach their children kitchen skills.



Fig 4.25. Mini kitchen in inKids with linefriends

Children's focus is mainly on the content of activities, the design should create a space to attract children to explore independently, therefore they could discover and excavate their interests and hobbies through activities in the space, gain knowledge and improve their self exploration through continuous exploration, so that they can intuitively touch, see and hear the things they are interested in at the first time. By designing more experiential and interactive devices and facilities, designers could enhance children's experience in the space, reduce the traditional forms of learning, develop more new projects based on children's curiosity.

When I went to inKids with linefriends, I saw the edge of the steps and the handrails wrapped in foam (Figure 4.26). In order to reduce the damage when children fall. And in the atmosphere of space, we need to give children a bright and clean space.



Fig 4.26. Photos at inkids with linefriends details

5.

5. The project —— MOON

The project is a building located in a large children's Park at the junction of two cities in Jiangsu Province, China. The whole park is still under construction. The purpose of this project is to design a children's physical activity center inside the building. In order to stimulate children's imagination, the project takes "flying to the moon" as the concept, and including coach assisted training, children's personal activities, parent-child interaction, fitness courses and catering functions. Providing children a place for education and fun.

5.1. Introduction of the project

Location: Junction of Huai'an and Yancheng, Jiangsu, China.



Fig 5.1

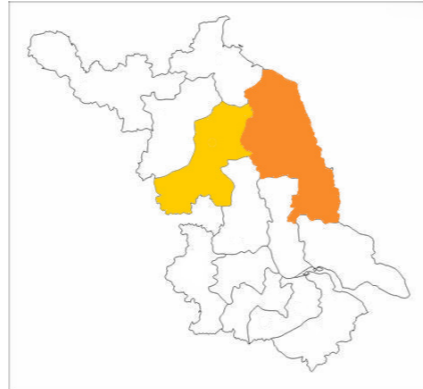


Fig 5.2

The surrounding environment is mainly planned for children's activities. There are four children's indoor activity buildings in the park, and the other three include literature museum, research museum and indoor plant museum (building No. 38, 39 and 40 in the Figure 5.3). The main purpose of these three indoor projects is to expand children's knowledge of science. The outdoor projects include immersive experience activities, such as farm work experience, maze, fruit picking, cruises and other recreational project. There is a primary school outside the park, so the children of primary school is mainly user of this park. At the same time, it is also open to children of other ages.

Building No. 37 in Figure 5.3 is the one where the project is located, which is also reserved as a children's indoor physical activity center. The building (Figure 5.4) has two floors, with a total construction area of 1640 square meters. There is a firefly camp (project No.24) and a summer garden (project No. 23) next to it. As the whole apartment is still under construction, there is no photos about the environment.



Fig 5.3



Fig 5.4

This project is designed for 3-12-year-old children and their parents, aiming at improving children's physical quality. The main functions will include children independent activity space, parent-child interaction space, coach assisted training space, group gymnastics classroom and some service spaces (rest area and dining area). Waiting area and coffee will be provided in consideration of parents' needs.



Fig 5.5. Ground floor plan of building

Fig 5.6. First floor plan of building

5.2. Case study

5.2.1. Nis school, Mexico City, Mexico

Architects: Sulkin Askenazi

Area: 605 m²

Project year: 2019

Category: Primary schools, Secondary School

User: Age groups from 2-8 years

Operation mode: The 600 square meters learning space is created to improve the creative potential of children between 2-8 years through design. The designers seek to support the children's growth through various environments that allow them to develop their skills with interactive learning. The space allows children to move freely between the different flexible spaces.

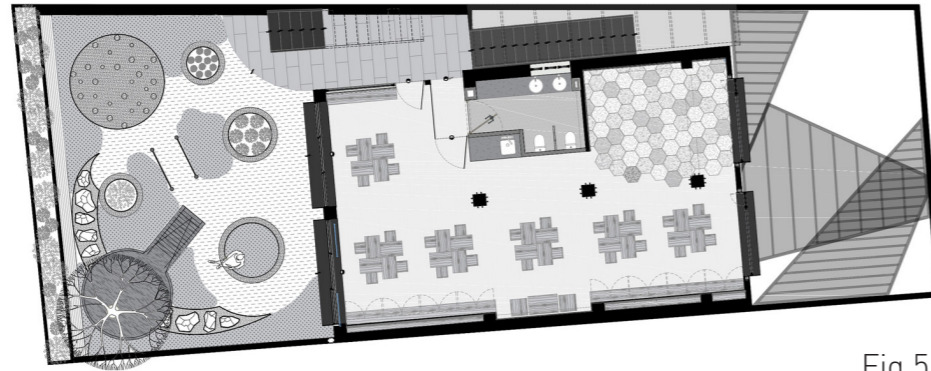


Fig 5.7

Keywords: Flexible, Nature, Warm

Design highlights: Two learning rooms that integrate nature into the interior design spaces. The classrooms have shelves consisting of geometric wooden modules for learning material and a reading space with hexagonal rugs, forming a pleasant and warm learning environment. This sensory space for movement and cohabiting is achieved through creating a playing environment for exploration, experimentation and discovery. The classroom has soft tactile materials such as cork and oak wood. The learning in the area is achieved with dynamic play using different elements that are made for children to explore, climb, jump and build with, developing different skills.

Reason for choice: This is an environment designed for exploration and discovery with soft materials such as cork and leather achieves the movement and exercise room. These materials provide security to children. Lighting systems and sunlight from the courtyard are designed to create a comfortable and natural environment.



Fig 5.8



Fig 5.9



Fig 5.10

Source: <https://www.archdaily.com/928889/nia-school-sulkin-askenazi>

5.2.2. Student Activity Center at Bangkok University, Bangkok, Thailand

Architects: Supermachine Studio

Area: 2200 m²

Project year: 2013

Category: Educational Architecture

User: Undergraduate

Operation mode: SAC (Student Activity Center) consists of diverse facility space, mainly for out-of-classroom ones, from photo studio, music rehearsal room, Thai dance club, 20+ faculty rooms, meeting rooms to Pom Pom cheer leader training hall. All of the students' programs have to be accommodated into the existing structure of the building that was not designed for.

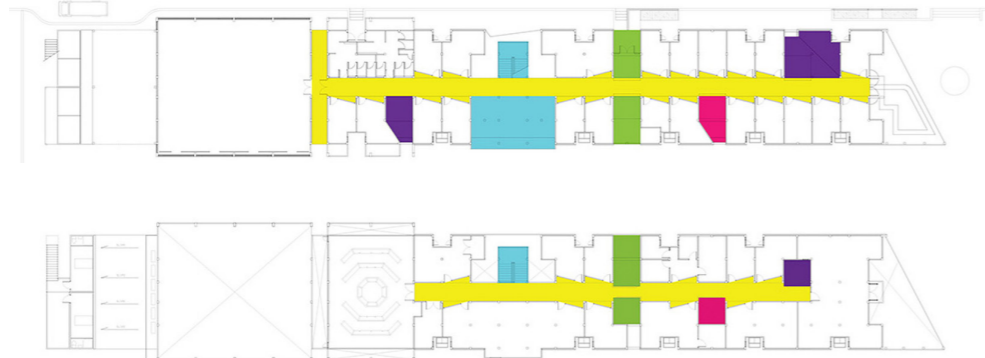


Fig 5.11

Keywords: Color partition, Vitality, Functionality, Free

Design highlights: The project is a renovation of the dormitory. Half of the inner space has been repainted systematically, with the existing corridors utilising vibrant yellows, purples, greens, pinks and turquoise. To achieve natural illumination, skylights flood the space with ample light, creating a vivid atmosphere. Students can rest and discuss in different activity areas when they are doing extracurricular activities here. And these open spaces are divided into different cubes by color. In the lounge, students can sing in a colorful karaoke room, have fun playing table tennis, do a group project with classmates, or even lay your back on a cozy sofa. IMAGINE Lounge virtually comes alive as a creative space for student to relax, imagine, and learn freely.

Reason for choice: I want to design a children activity space, which needs to include many activity rooms. SAC contains a variety of activity rooms, and connected with leisure corridors. It uses colors with high saturation to give students a visual impact and bring vitality to students. This Lounge is simply made to serve users the way they want.

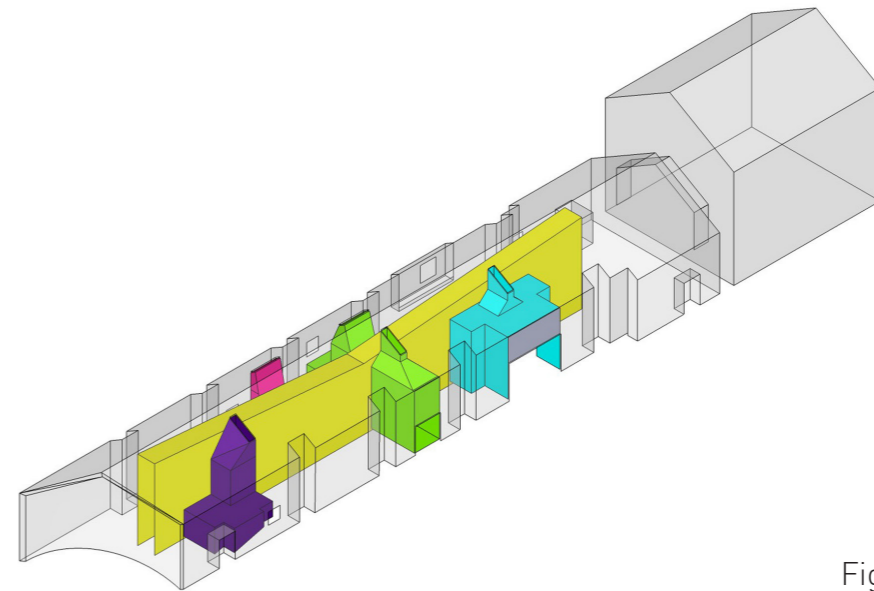


Fig 5.12



Fig 5.13



Fig 5.14

Source: <https://www.archdaily.com/469976/student-activity-center-at-bangkok-university-supermachine-studio>

5.2.3. Ama'r Children's culture House, Copenhagen, Denmark

Architects: Dorte Mandrup Arkitekter

Project year: 2013

Category: Culture house

User: age groups from 0-18 years

Operation mode: Ama'r Children's Culture House is the world's first new built children's culture house developed with children. The Children's Culture House is an innovative project developed with the fanciful and fun input of children. The Culture House is a Danish Villa Villekulla that offers a unique range of spatial experiences and cultural activities.

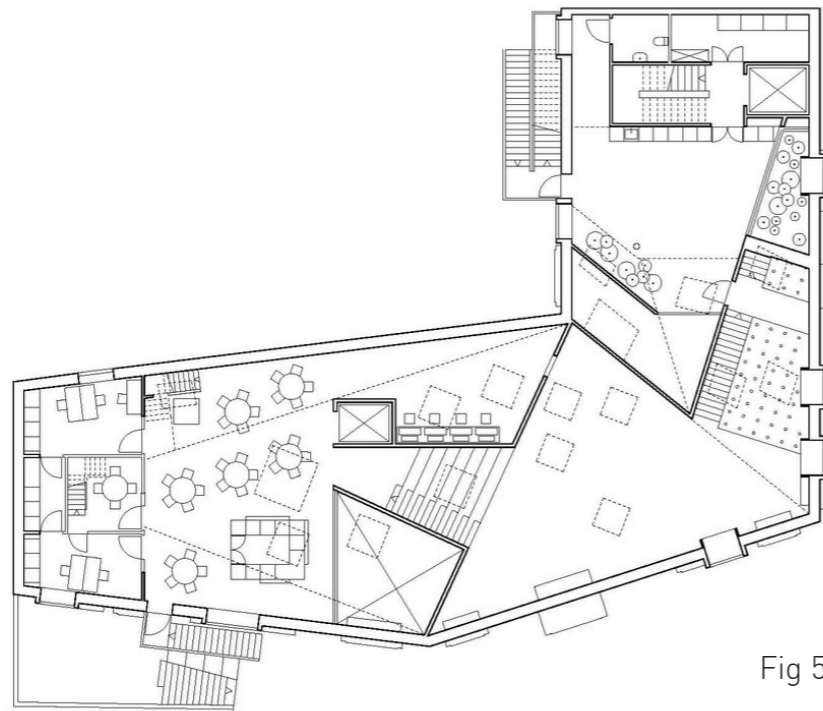


Fig 5.15

Keywords: Extruding, Cutting, Sunlight

Design highlights: The Children's Culture House mediates the varying scales of adjacent buildings through extruding and cutting their forms. The joint of the building, where the extended lines of the existing buildings meet, is lowered to allow maximum sunlight to reach the neighboring courtyard. The expression of the Children's Culture House is surprising and imaginative: the roof and facades are treated the same, and the House does not have a "start" and "end" as ordinary houses do.

Reason for choice: Dorte Mandrup considered the children's countless ideas and wishes throughout the design process. They have created a house with many intriguing angles, caves and stairs that provide a wealth of opportunities for creative expression and exploration. Just like the kids wished for "dream come true!".



Fig 5.16



Fig 5.17



Fig 5.18

Source: <https://www.archdaily.com/388629/ama-r-children-s-culture-house-dorte-mandrup>

5.2.4. Lolly-Laputan Educational Restaurant, Dalian, China

Architects: Wutopia Lab

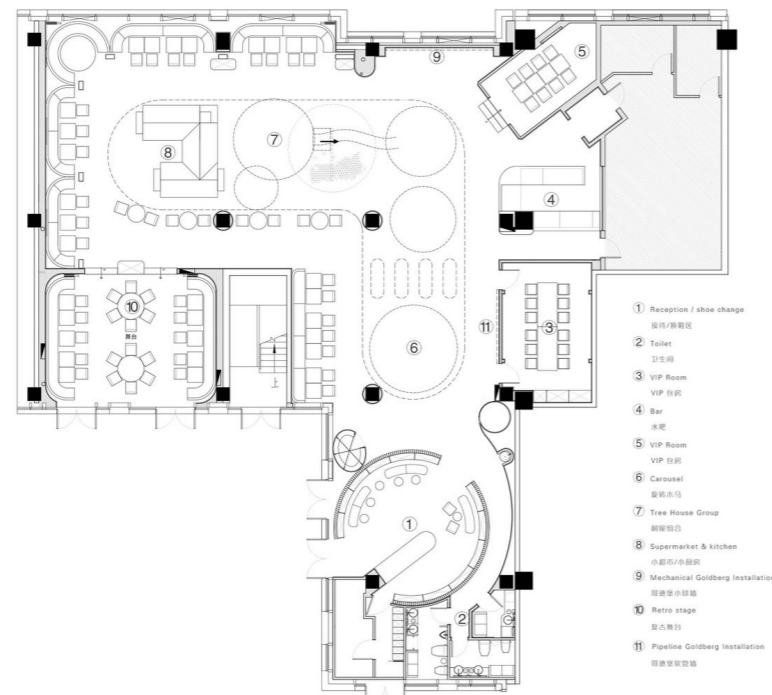
Area: 580 m²

Project year: 2019

Category: Restaurant

User: All ages

Operation mode: The brand is mutually owned by PACEE Education and Fairyland so that there will be shared resources from PACEE that the client wishes kids can enjoy learning with entertainment. This cafe will be the first educational family restaurant in China.



Keywords: Intergration, Fairyland, Artificial

Design highlights: The front lobby is a circular space surrounded by forest of lights, which is composed of 1000 acrylic tubes that are able simulate the effect of sunlight shining through thick layers of leaves to provide a unique forest experience, with the reflection of the mirrored wall. The central area is the Cloudy Town, the wonderland for kids. They can enjoy the Ocean of Clouds made of acrylic, with tree houses, slides, ball pit hidden in between. Surrounded the Cloudy Town will be the food area.

Reason for choice: This is a case of inserting children's activity space into a restaurant, which harmoniously integrates two different functional spaces. Just like their dining area is themed with stage, the whole space is dominated by children. The future and the past are now interweaved, and the stage is ready for them to dance.



https://www.archdaily.com/919023/lolly-laputan-wutopia-lab?ad_medium=gallery

5.2.5. Tamra Elementary School, Tamra, Israel

Operation mode: The area designated for First Grade students was designed to allow for imaginative learning. Special detail was paid to soften the transition from Kindergarten to First Grade.

Design highlights: The space was created using a contemporary modern design language but incorporates elements of Arabic culture, taking inspiration from the embroidery in traditional dresses. The black, white and red color scheme accompanied by trees draws inspiration from Arab folktales. A famous poem in Arabic is carved into the natural wood of the large piece. The library stores a variety of didactic games for the children to play with. The wooden cabinet doors are affixed with decorative Arabic elements.

Reason for choice: The complex was created reflecting an environmentally friendly design while promoting an enjoyable learning experience. The environment is an educator within itself, shaping creative thinkers and encouraging experimentation and exploration.



Fig 5.23 & 5.24

5.2.6. Play Scape café by maum studio, Seoul, South Korea

Operation mode: Maum studio designed a new kids cafe which is located in a shopping mall in Seoul. The cafe provides play facilities for children.

Design highlights: To overcome the environmental limit of the site caused by diagonal cut plane, large column in the middle of the space and small space area, the hall in the center is designed to occupy a large portion of the area. Open space in the interior is divided by walls coming down from the ceiling and by signage installed on the walls. Every sports day item such as table tennis racket shaped slider in the middle, swimming pool like ball pool, target shooting zone is made in diverse colors to promote an active sports day atmosphere.

Reason for choice: The designer took 'sports day' as a design concept to promote space where kids can play free wit vivid energy. As a result, a new space with a solid brand identity is created where all the design elements of graphic, interior, furniture and products design are unified.



Fig 5.25 & 5.26

5.3. CONCEPT



"Fly to the moon" is chosen as the concept of the project, so that children can explore this space as they explore the universe.

SPACE



EXPLORING



LOGO design

The concept of this space is "fly to the moon" and it is named after MOON. Design of space, moon is used as the site prototype to give children the feeling of outer space. The color of moon and spacecraft is the main color for the creation of space atmosphere, avoid too many colors and high saturation colors cause children's visual fatigue. The furniture design is based on the principle of children's ergonomics. Exploring space will be the main experience, it might be helpful to guide children go forward and upward.

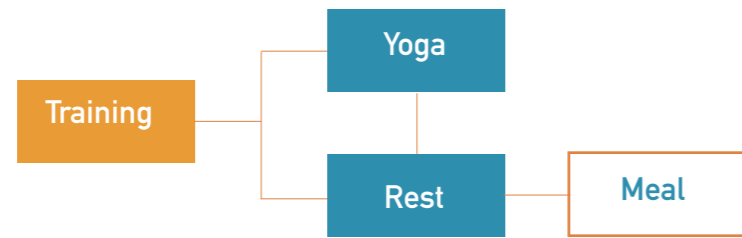
In the logo design of the commercial part, the figure of moon and astronaut was retained. Moon represents the site and astronauts represent the protagonist (children) in the site. The shape of the full moon was selected as the basis to avoid the edges and corners in the font design. Hard edges and corners were also avoided in the whole space in order to reduce unnecessary risk factors for children.

This venue is mainly for two types of people: consumers (children and parents), employees (coaches). Although children are the main users of this venue, children themselves do not have the financial ability, which means they still need parents to pay for them, so parents and children's feeling should be considered at the same time.

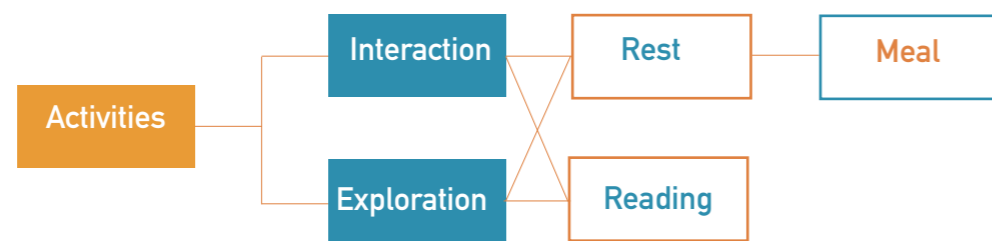
According to the survey results mentioned above, in order to improve the consumer's sense of use, the space provides parents with a parent-child interaction area and a rest waiting area. In addition to basic activities for children, nutritious meals will be also provided in the space. There are professional training coaches in the venue, who will provide targeted training for children and also play a role in care and management to avoid children's physical collisions, quarrels and fights among children. The project will try to solve the problems of existing children's activity space in the market.

5.4. Story line and functions

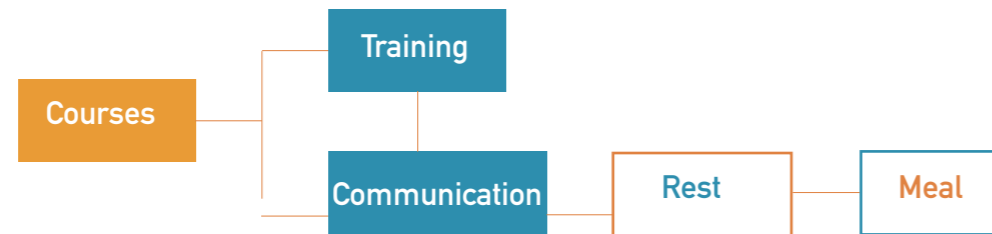
Child A
Purpose: Lose weight



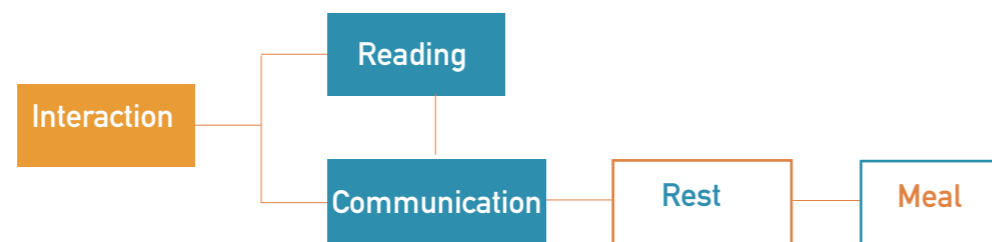
Child B
Purpose: Have fun



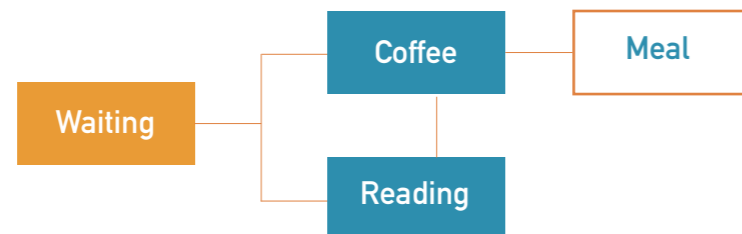
Child C
Purpose: Professional training



Praent A
Purpose: Accompany his/her child



Praent B
Purpose: Wait for his/her child



The activities of different identities in this space

CHILDREN



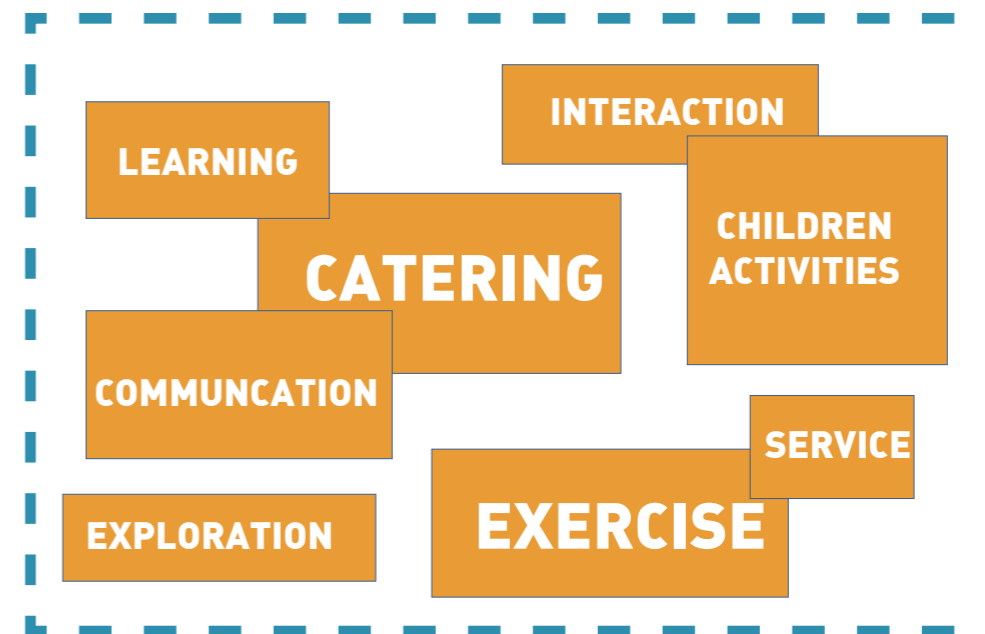
COACHES



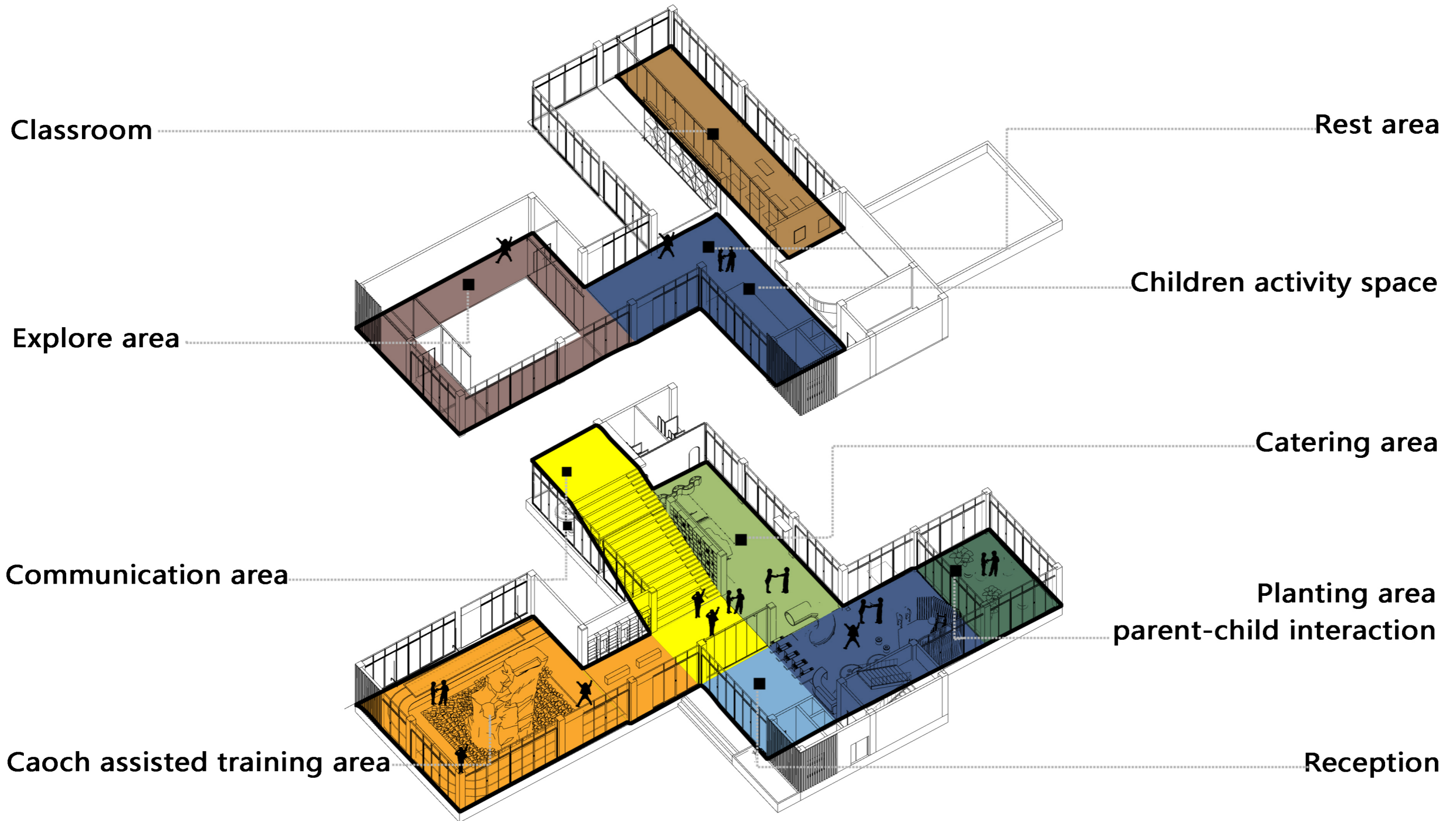
PARENTS



The function of this space



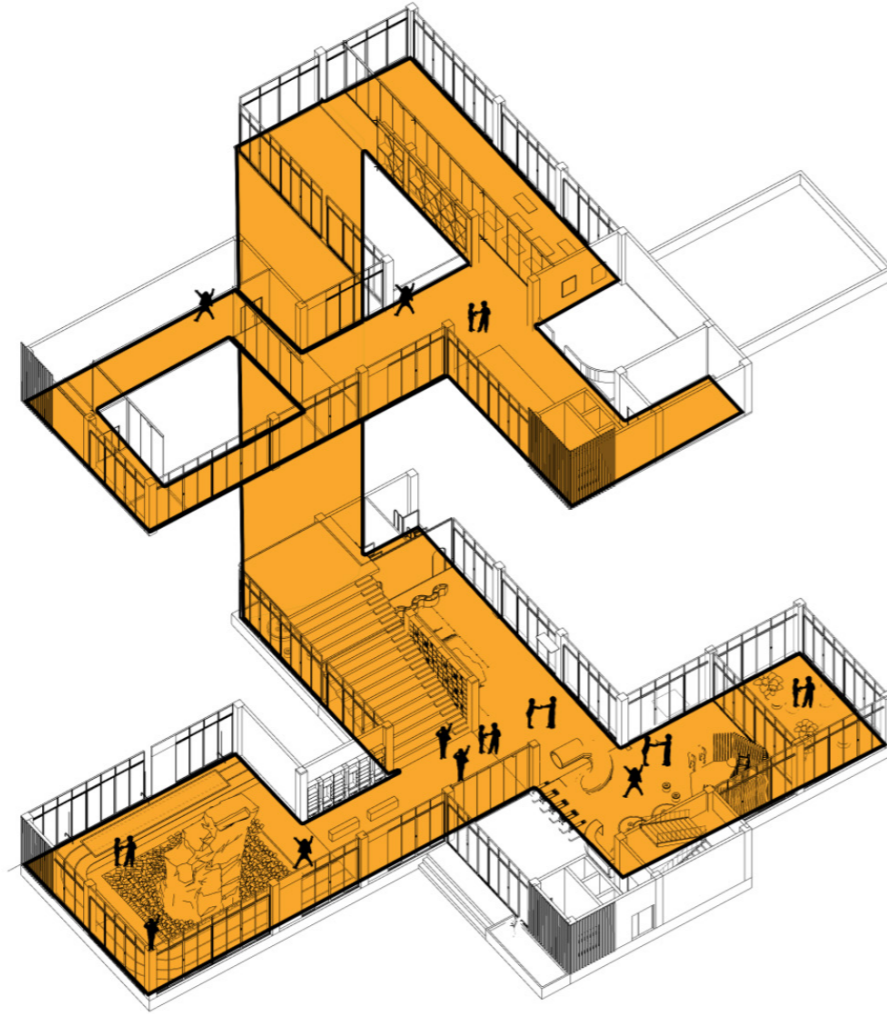
FUNCTION PARTITION





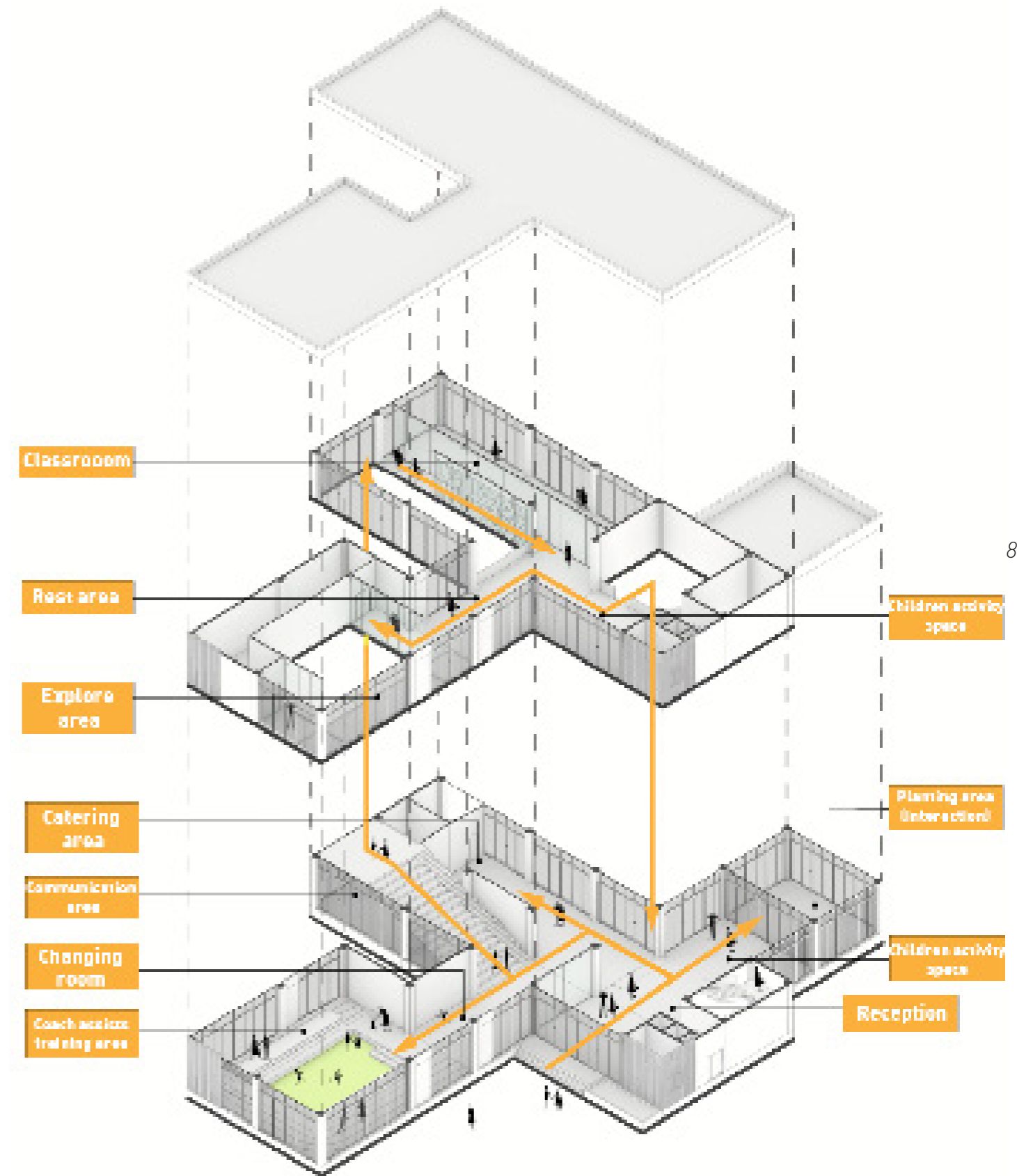
Children space

- Children activity space
- Catering area
- Changing room
- Classroom
- Communication area
- Coach assists training area
- Explore area
- Interaction area
- Rest area



The whole project is designed for children, so the children occupy all the space in the building. Some children come here for training or class according to the scheduled course time that they had made an appointment. They can go to the changing room directly to change the training clothes and do physical exercise in the coach assistants training area, or go to classroom. Some children just want to exercise and play by themselves. They can go to the children activity space and explore area directly. The planting area can provide all the members parents-children time. Under the guidance of their parents, children can complete planting experience in the sunshine room, Communication area and rest area are spaces for children to communicate with their peers, where children can make new friends and share what they have learned here.

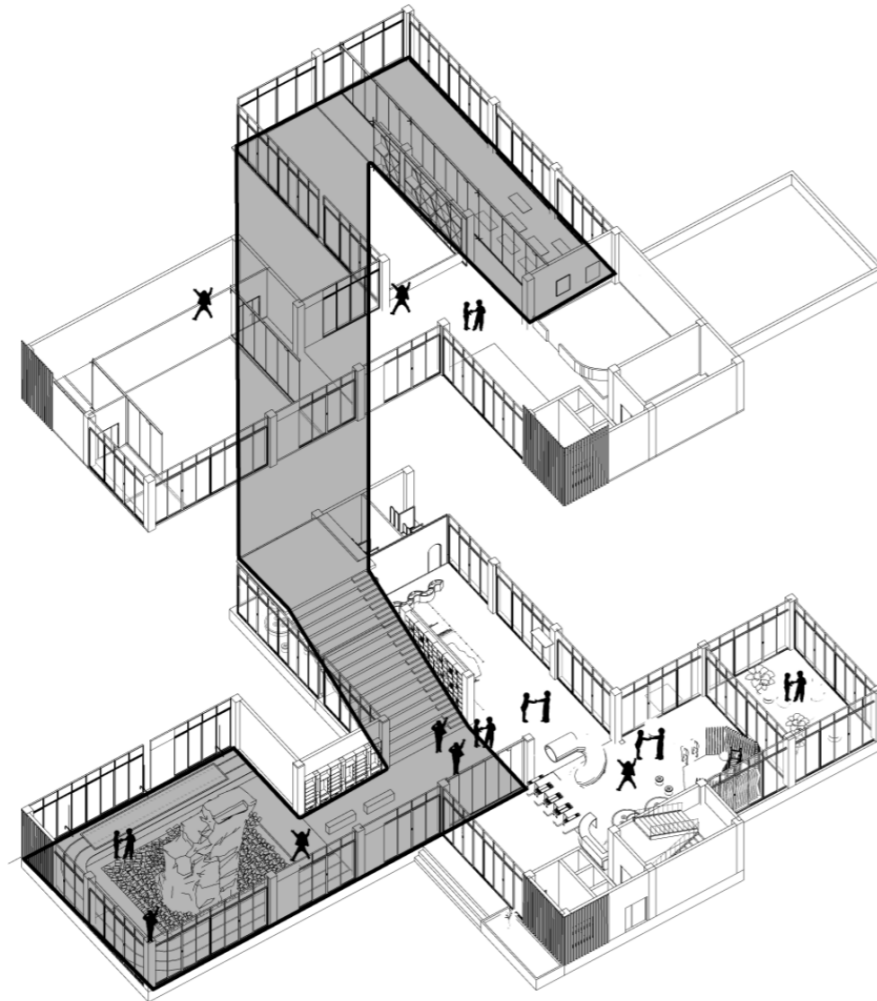
Children's journey map





Coaches space

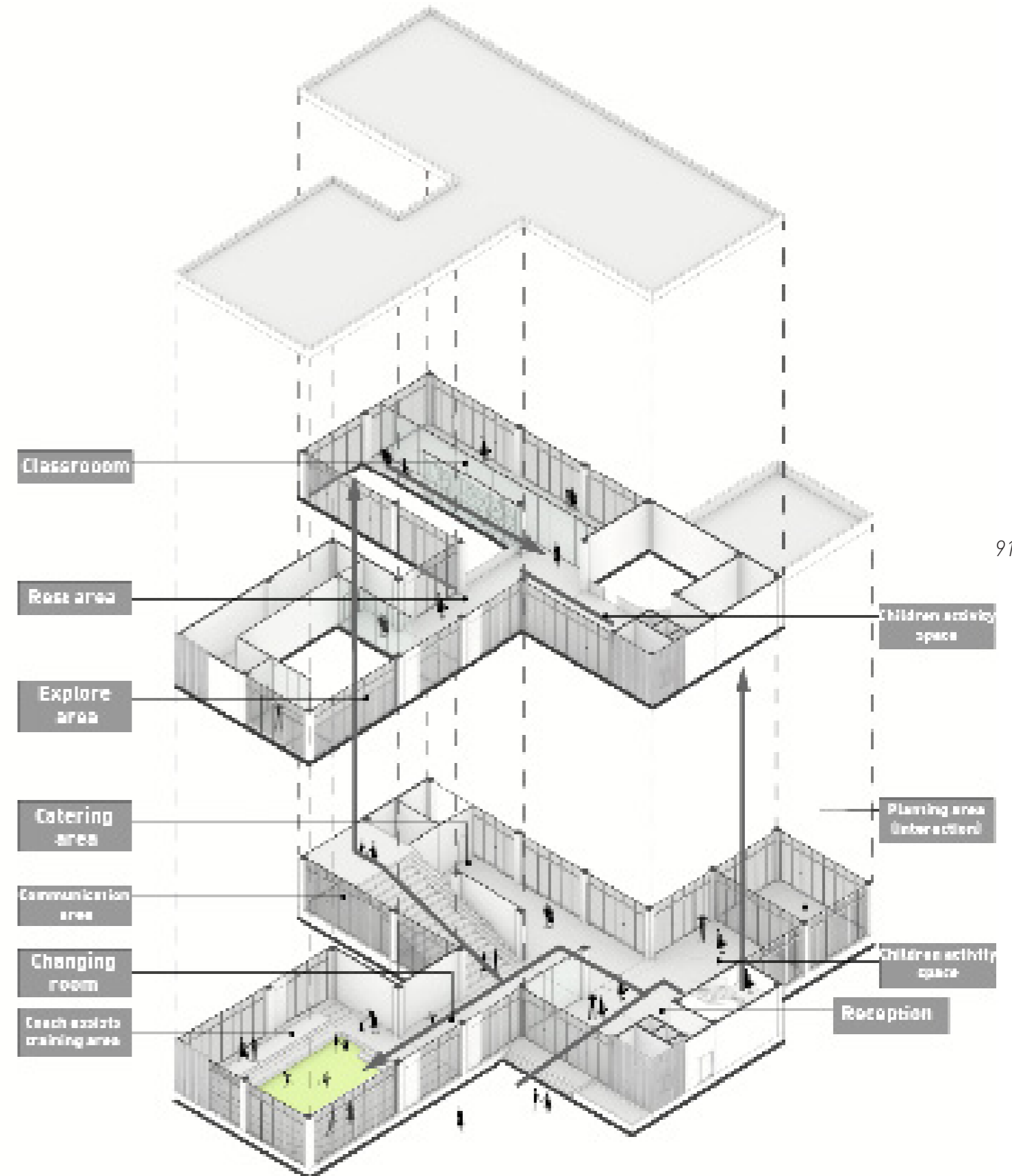
Changing room
Classroom
Communication area
Coach assists training area



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Coaches play an important role in this project. They are the employees and organizers of the space. They need to help children change the climbing equipments before them use the climbing wall. When training children in the training area, the form of personal trainer is used to ensure the safety of children in physical activities. When there are classes on the schedule, coaches need to arrive in the classroom to teach sports knowledge to the children. After class or at the end of the training, the coach can lead the children to the communication area and organize after-school activities or discuss new skills the children learned. At the same time, the communication area is also a place where coaches can exchange training skills with colleagues and develop new courses.

Coaches's journey map

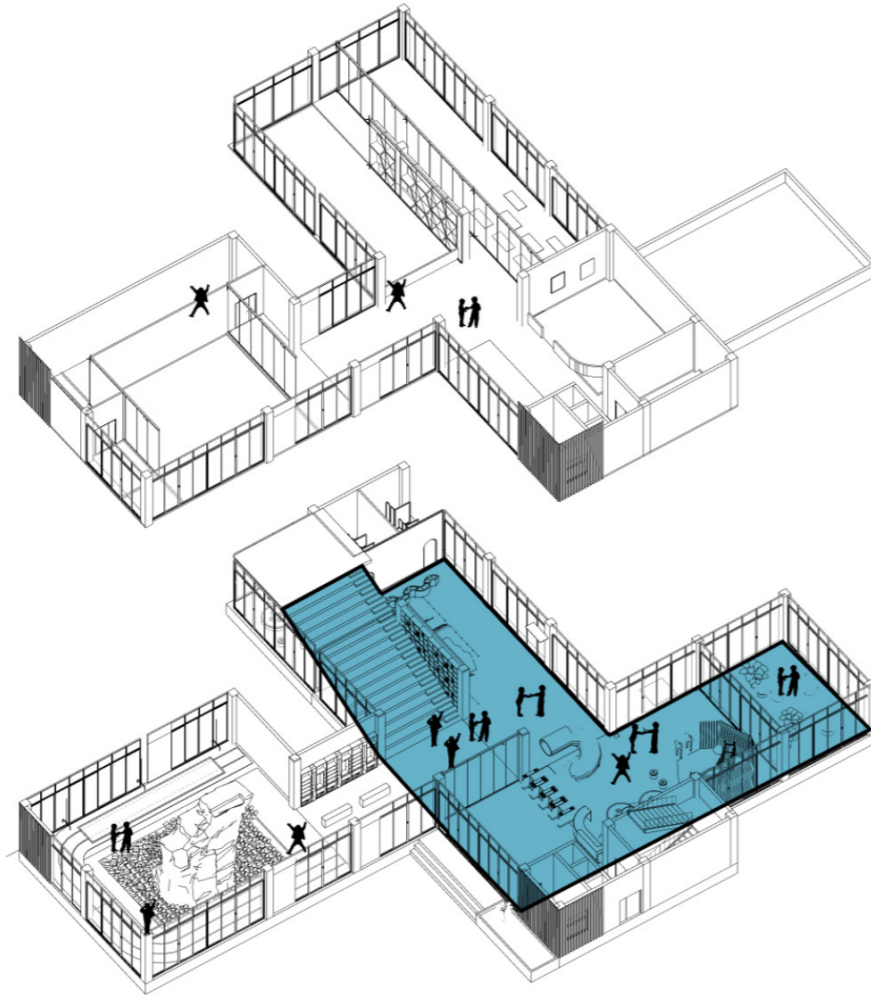


91



Parents space

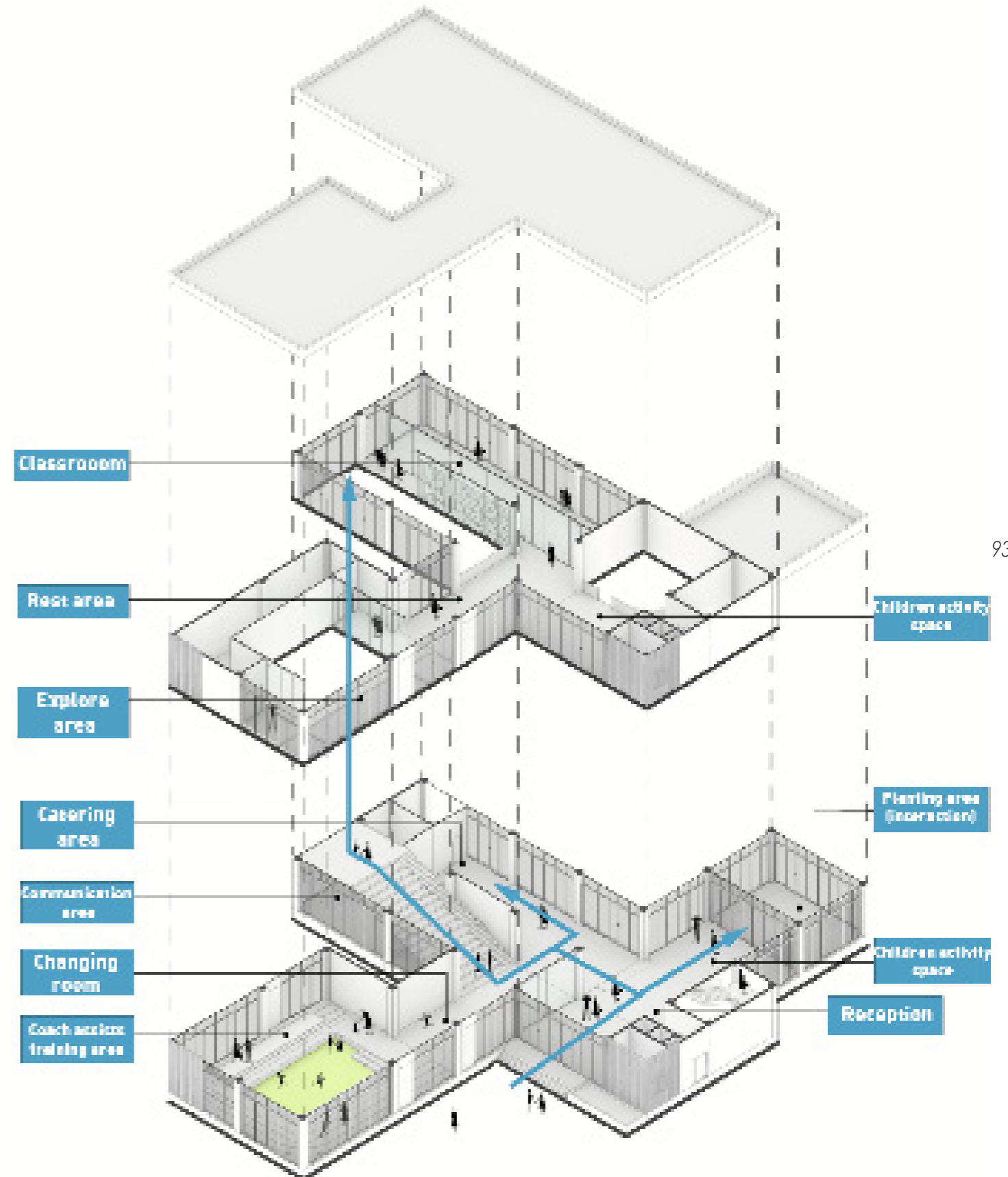
Reception
Catering area
Communication area
Interaction area



92

Parents play an accompanying role in this project. They need to book their children's courses with the staff in advance at the front desk in reception, so as to ensure that the children have a coach is available to guide their children training when they want to train. If parents want to accompany their children to play, they can have free activities in the children activity space. There is also a special planting area for parents to leave time for their children. Parents and children complete the plant planting experience together. In the catering area, parents can not only accompany their children to dinner, but also can have a cup of coffee at the time point of children's training, sit down and wait for their children to finish class. In the communication area, parents can do any desk activities which they want to play with their children, and they can also participate in their children's after-class communication.

Parents's journey map



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5.5. Spaces



The ground floor plan



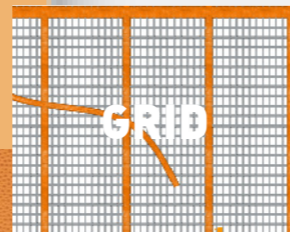
The first floor plan



Catering area on the ground floor



SAND

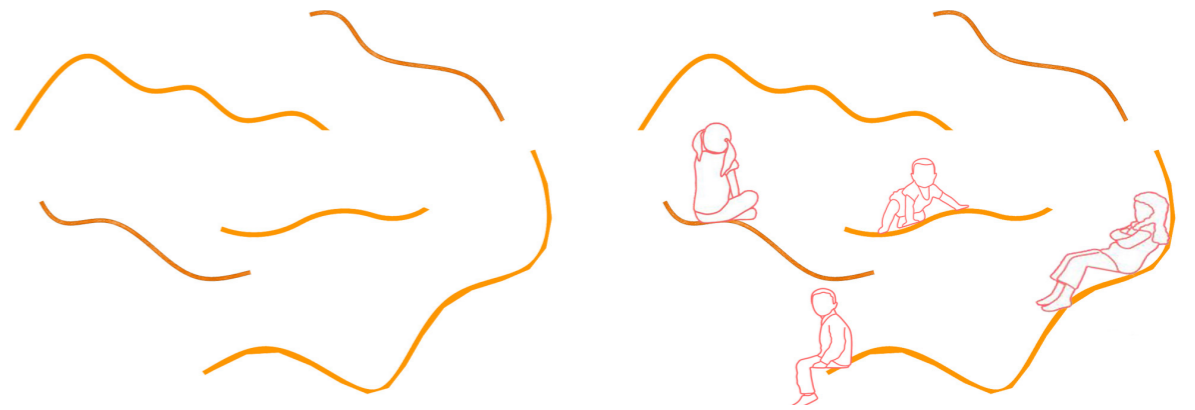


GRID

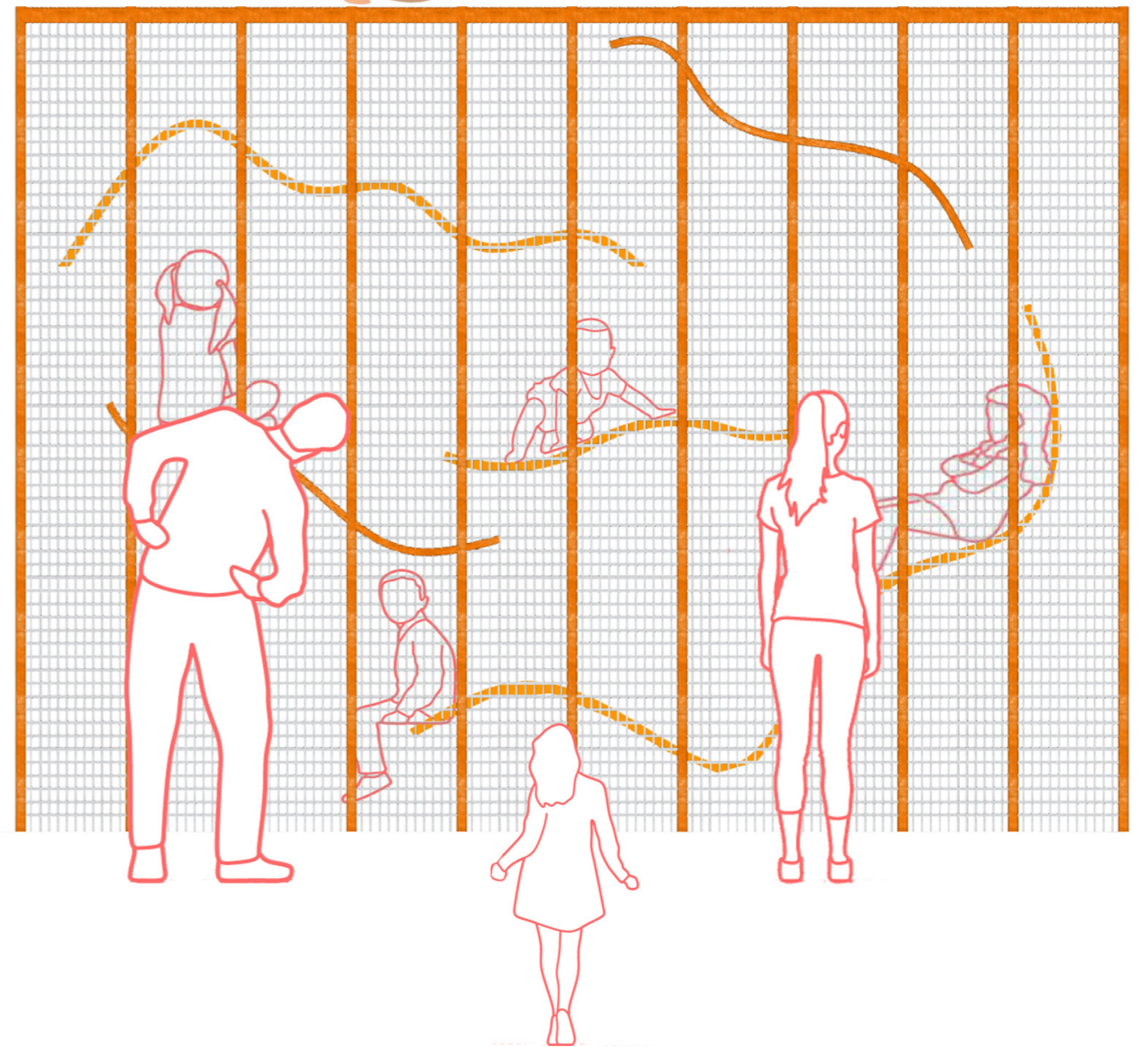


LEATHER

MOODBOARD

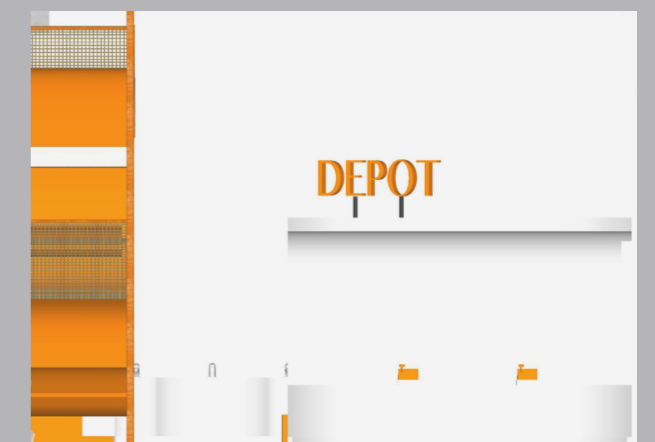
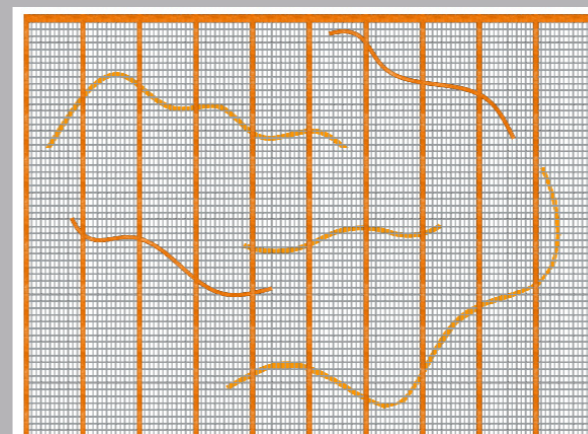


This is a children's facility in the catering area. In this space, children can replenish energy and have a rest. Parents can also rest here and wait for the children's training to finish. Here, I have installed boards on the wall that allow children to climb up and lie down on these boards. These boards are like ribbon floating on the wall. The children sit on it as if floating in the air, which simulates the astronauts floating in the air because of no gravity in space. In order to prevent the children from falling, I added a protective net on the other side of the board, so that the children can safely crawl inside, have a rest and play in the air.



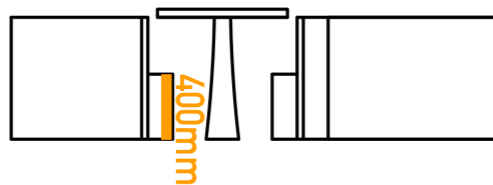
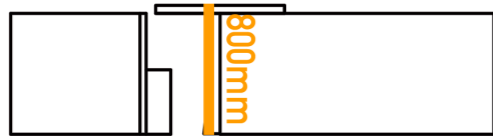
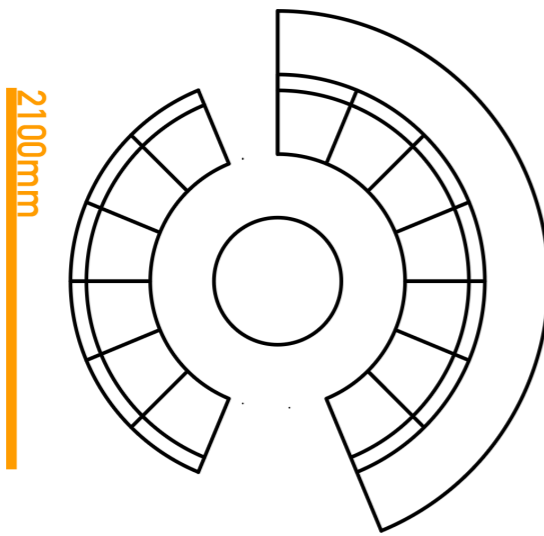


This space is a catering area for children. The energy consumed by children's exploration in space can be supplemented here. Therefore, I designed the dining car in the shape of depot. Children's sand on the ground to create a sandy atmosphere on the surface of the moon. In terms of space color selection, on the one hand, it is close to the color of the moon seen by children, on the other hand, orange is a color that can make people feel vitality, it makes the children more energetic.



Furniture design

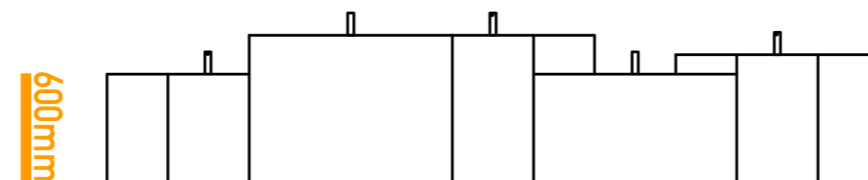
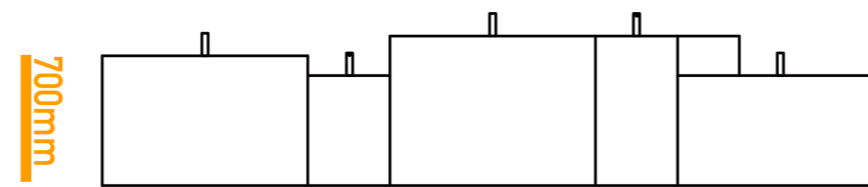
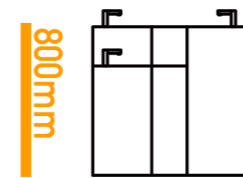
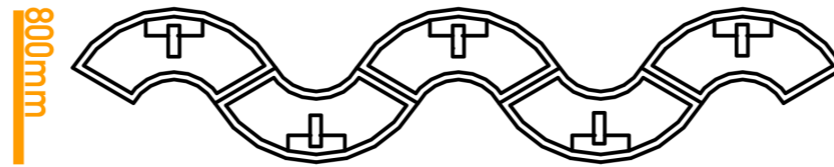
2500mm



Dining table design

Shape based on UFO, it can accommodate multiple families.

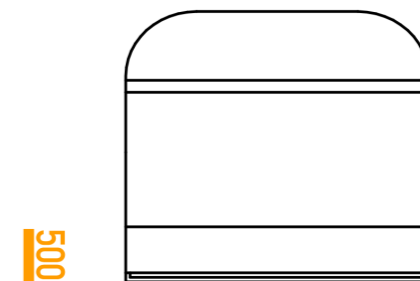
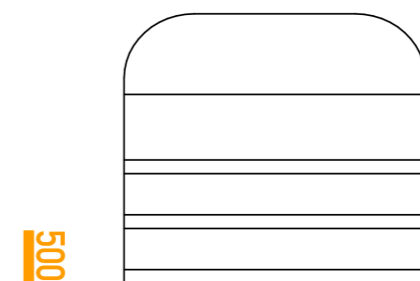
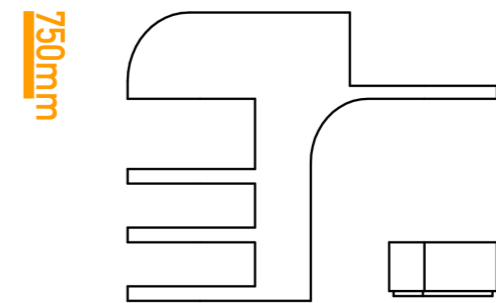
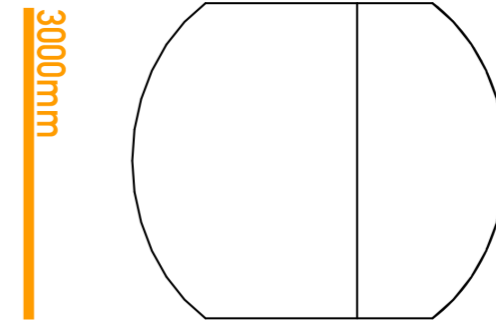
4000mm



Hand washing table design

It can be used on both side, considering the height of different age groups.

3600mm



Hand washing table design

Take Moon as prototype, adopt the filleted corner of the edge.

Scene comic

Step 1: pick your favorite fruit.



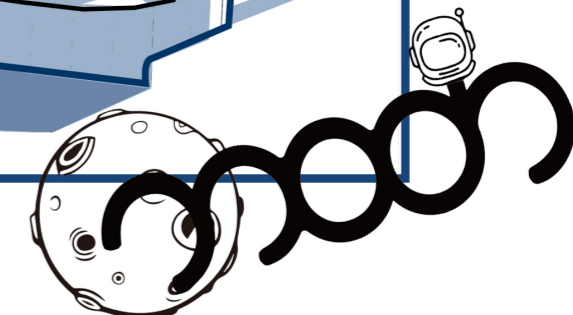
Step 2: Pay for goods.

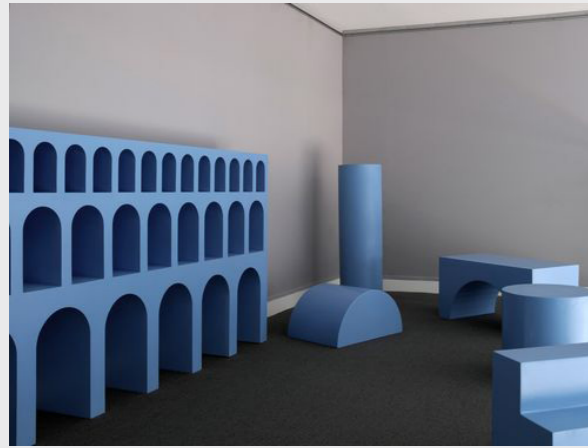


Step 3: Wash your hands.



Step 4: Enjoy delicious meal.





Classrooms and rest area on the first floor

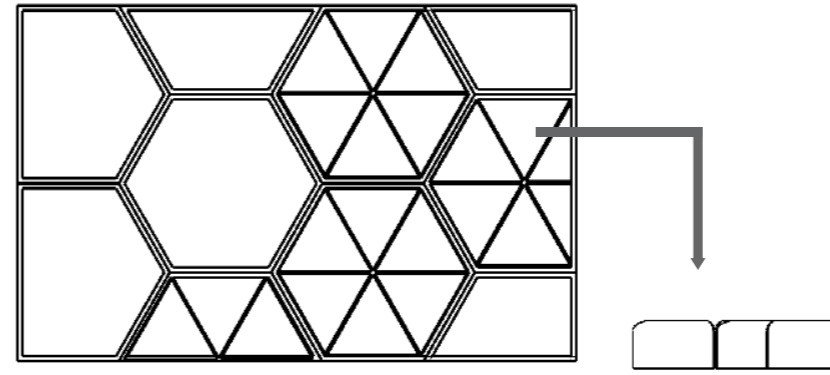
MOODBOARD



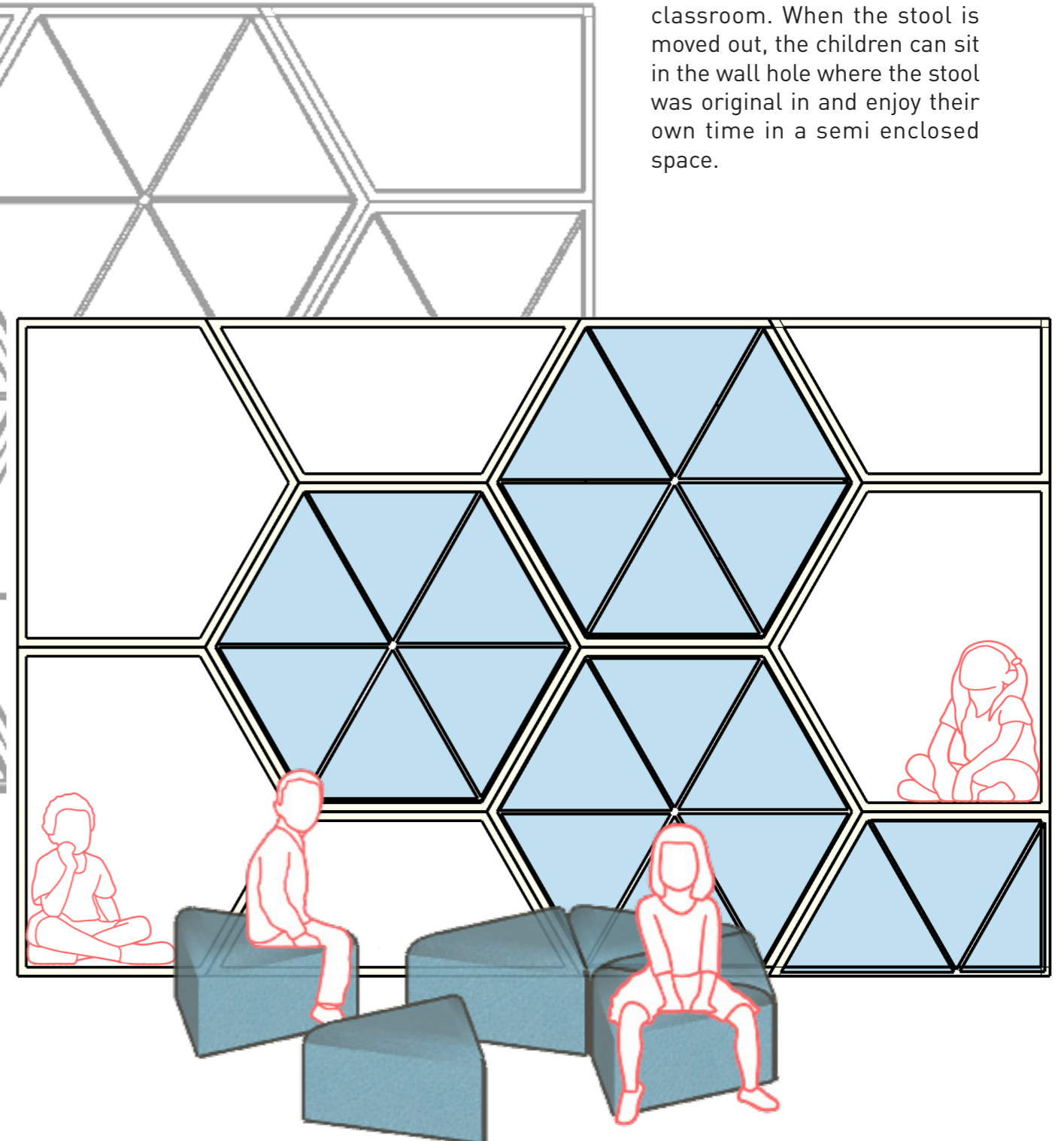
GLASS

YOGA MAT

LEATHER



This is the moodboard of first floor, this wall is located on the side of the corridor near the classroom. The wall with many hexagonal holes and each hole has six hexagonal stools. If necessary, the coaches can take the stool out of the wall and use it in the classroom. When the stool is moved out, the children can sit in the wall hole where the stool was original in and enjoy their own time in a semi enclosed space.





This space is classrooms and rest area on the first floor. I choose blue as the main color. Blue is a color that can calm children down, which can help children focus on class and help them have a good rest. The seat decoration in the rest area wants to bring a kind of visual effect of fireworks to the children, which means that they can fly and shine in the sky.

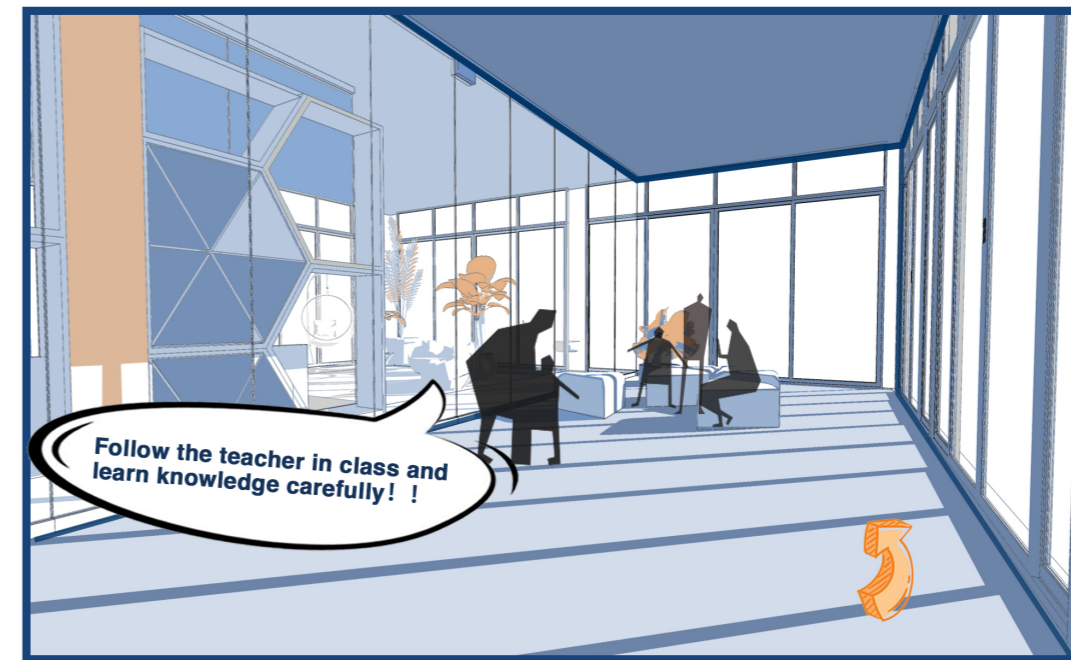


Scene comic

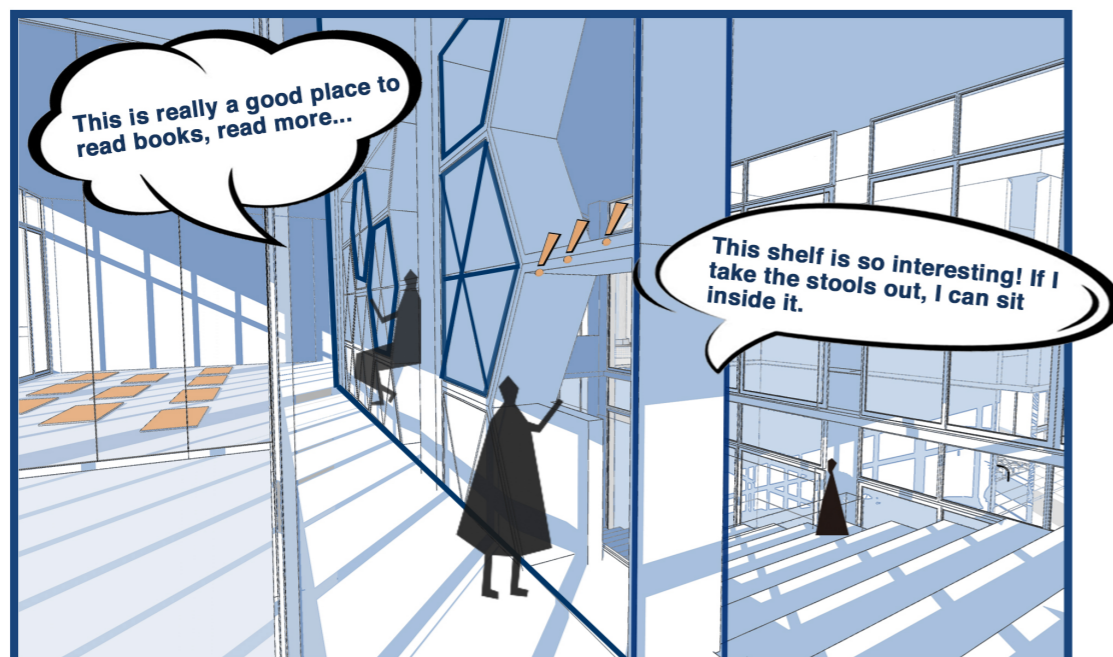
Activity 1: Doing yoga exercise.



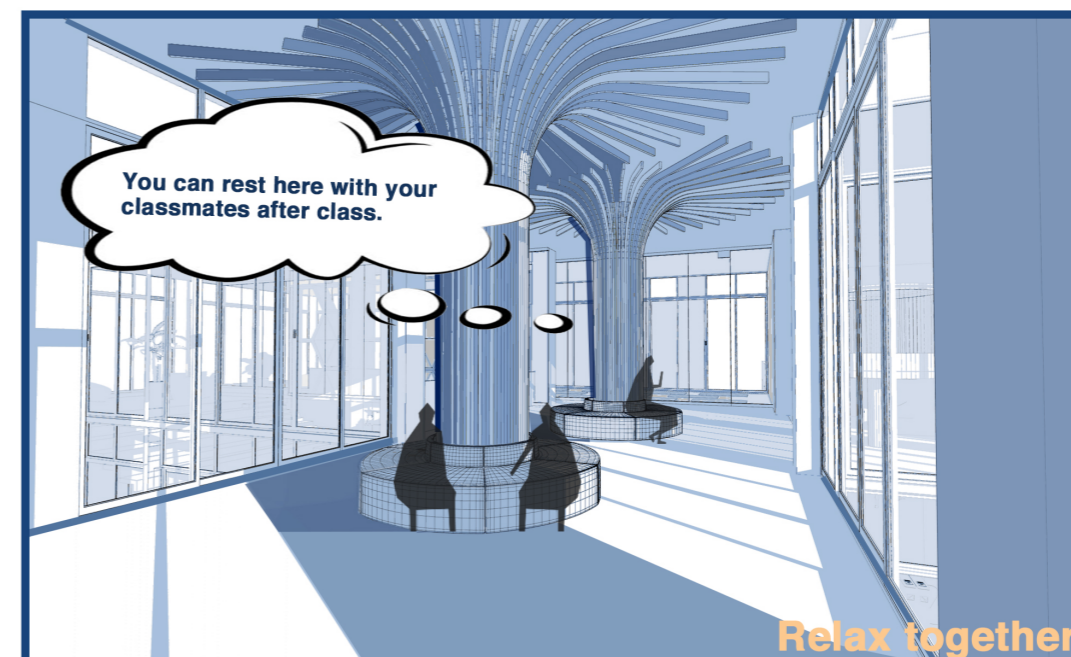
Activity 2: Learn knowledge with the teacher.



Activity 3: Reading with classmates.

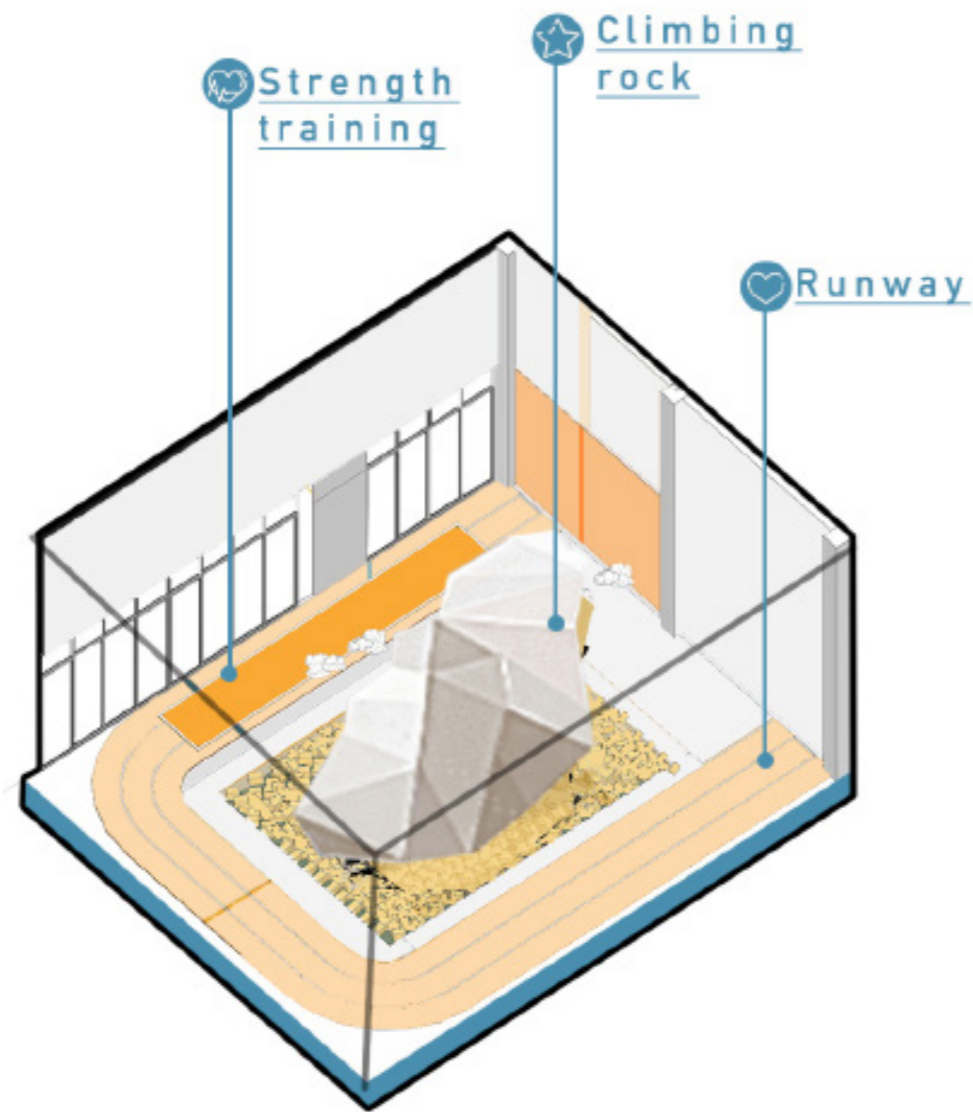


Activity 4: Rest and chat with peers.



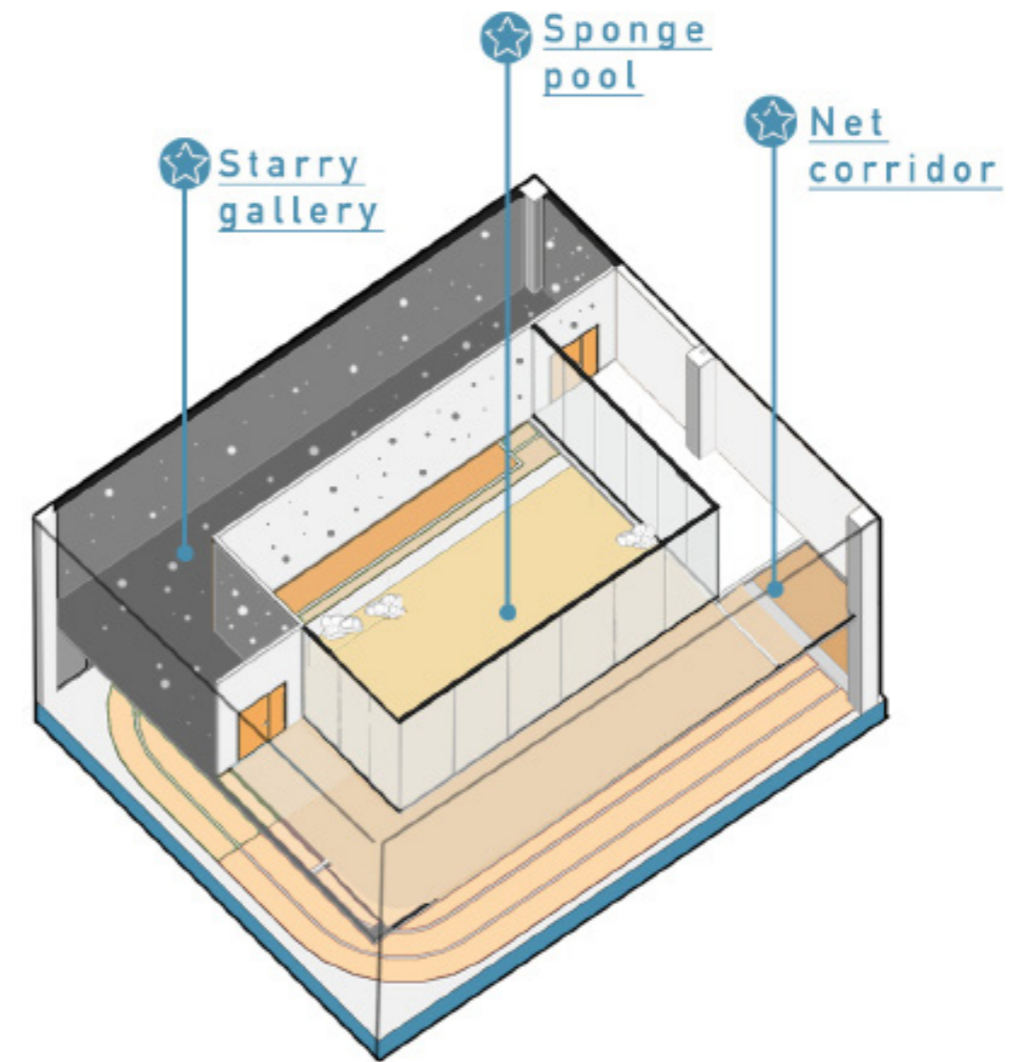
Relax together

Training area on the ground floor



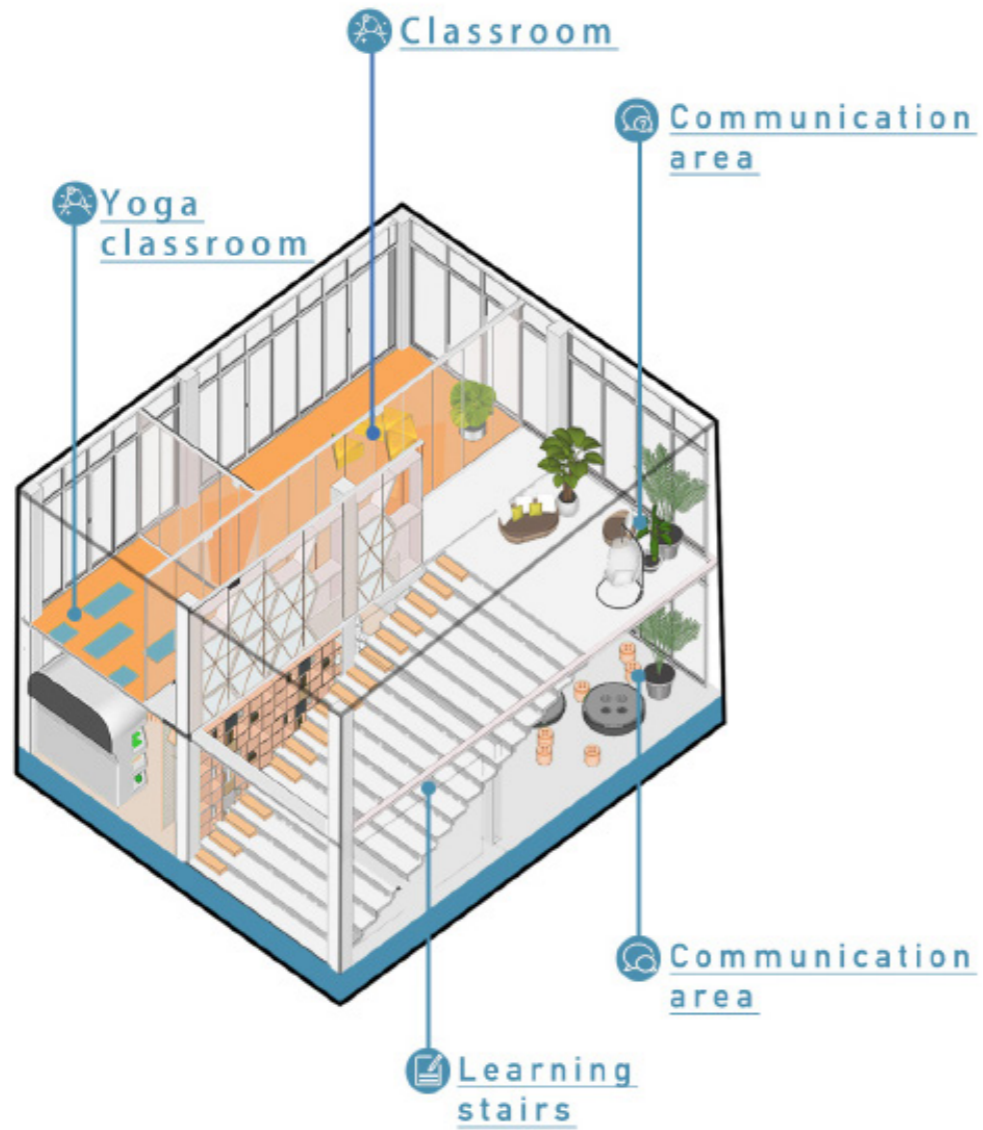
The training area is in a one-to-one mode. One coach accompanies one child to train. The middle part is a climbing wall that runs through two levels. Underneath part is a sponge pool. Although the children will wear sling equipment, sponges must be used to protect children. The sponge pool design is based on the track for a week, half of which has added rings to enhance the children's arm strength.

Exploration area on the first floor



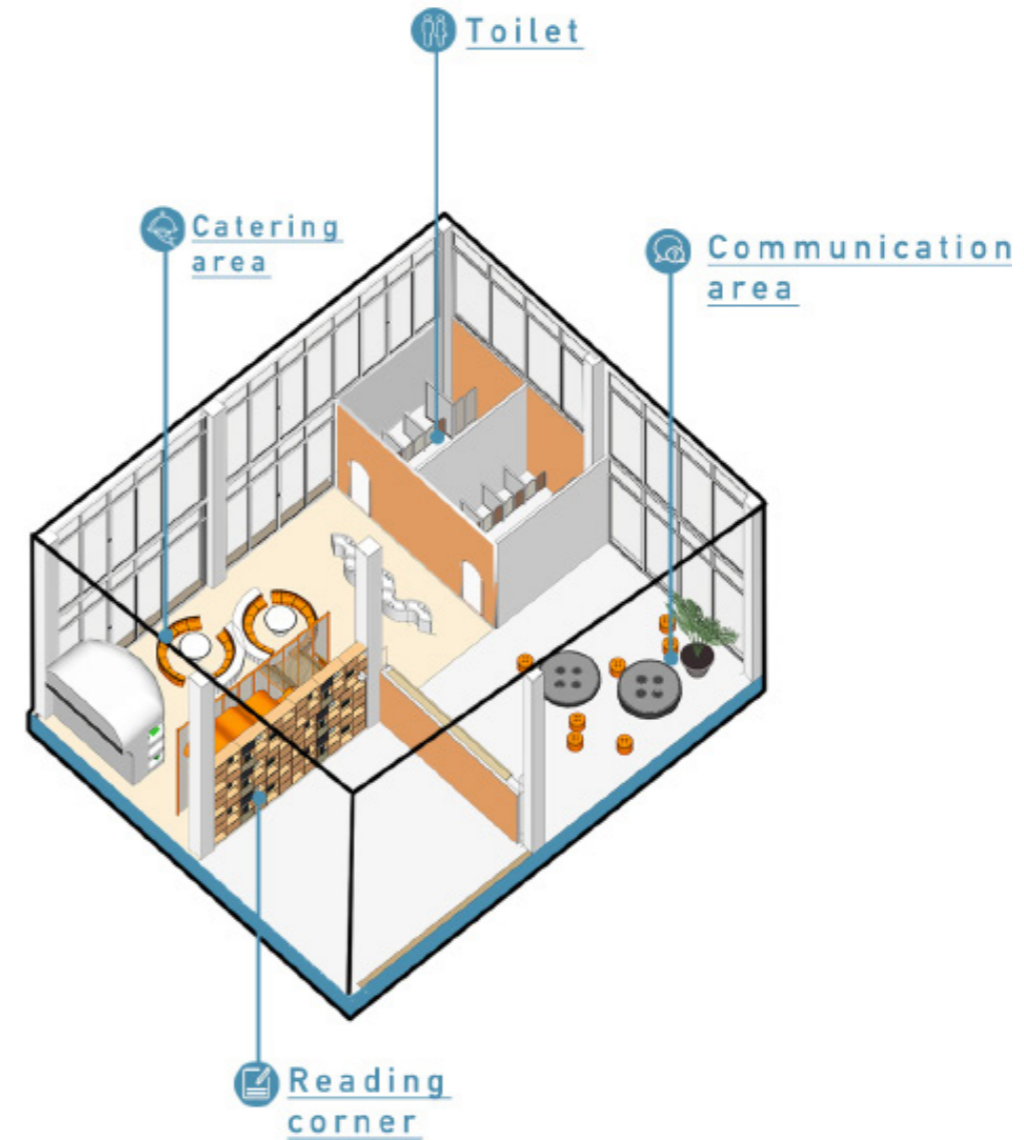
The entire exploration area is an aerial corridor, half of which is the transparency of the net bed and the transparent glass partition and the white net bed which creates the feeling of drifting above the clouds. Parents will be able to watch the children training and the scene of climbing on the hill in the middle of the site here. The other half is used as a completely black enclosed corridor space with light holes on the wall to create an environment of stars in the night sky. Children could see through those holes to explore the "outside space". Whether it is climbing on a white net bed or advancing in a black promenade, it will require patience of children.

Training area on the ground floor



The design of conventional staircase on one side has taken into account the height of the child using 120mm each step, which was lower than the normal single-step height. The other side was designed as a public recreation area, where all the use of the entire site could sit, rest, chat and read books. On one side of the stairs is a bookshelf, where multiple types of books will be provided. At the top of the stairs is a space for reading communication.

Communication area on the ground floor



The communication area is located under the stairs, the height of the wall can be used by children, so the communication board is installed here. This space is equipped with prototype cushions and stools. Children can lie down, sit and discuss without restraint. There is a communication board on the wall which is made of magnets and could be used for their own ideas, goals and tasks, children can feel free to write something down on the sticky note and attach it to the communication board.



Section 1



Section 2

6. Conclusion

6.1. future development

The purpose of this research is to create a fun space to attract children away from video games, this space will provide children with physical activity space which is beneficial to both parents and children.

In terms of the current situation in China, it is common for many parents that their children is taken care of by their grandparents because they are busy at working for the most of time. Therefore, children's physical health problems might be ignored. Grandparents always meet the requirements of the children, whether it is about food, watching TV or playing games. For those parents, it will be a good solution to take children to a place with professional staffs who can take care of and educate them and the children might also be willing to accept this activity.

In addition to the functionality of space, the significance of the research is to redefine the image of children and the image of children's space, understand what children really need, create this space and stimulate children's creation and cultivate children's aesthetics.

As in an information age, space is also a scene of moment in social software. Many parents are happy to share the growth process of their children in the software. A space that can help children grow up healthily and share parent-child time will also be a perfect background of this moment. For brands, improving their own internal space design might have free advertisements though parents and the result is that both consumers and merchants would be satisfied.

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