# Real-IN

## Multifunctional toy kit based on intelligent interactive technology and physical accessories

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# Abstract

One of the biggest challenges facing parents today with the development of The Times and advances in technology is how and by how much to reduce the amount of time their children spend on electronic devices such as phones, tablets, video games, televisions and computers. This is not just a problem for older children, many younger children have also started using and are attracted to mobile phones.

Screen-staring is not uncommon for babies and toddlers, and as children get older, early electronic product use often translates into constant screen time. The physical and mental harm of electronic products to children is obvious, it is easy to cause children's language retardation, difficulty in falling asleep, vision loss and other physiological effects, but also can cause children hyperactivity disorder, anxiety and other psychological effects. At the same time, the use of electronic devices with screens often means passive entertainment. Even when children use electronic devices for educational purposes (such as reading, doing research or playing math games), they are still simply receiving information, rather than thinking, creating or imagining it. So parents try to find something to distract or calm their children. Since the social environment determines that children cannot completely avoid electronic contact, designer can use electronic products that have less physiological impact on children to interact with them, using the combination of virtual interactive projection technology and physical toys，attracting children's attention more to physical toys, guiding children to produce active thinking ability and exercise children's hands-on ability.

**Keywords:** Electronic addiction, Return to reality, Combination of virtual and real, Physical and mental health, Only for children

# Context Analysis

# 1. Trends

## 1.1 Global Trends

In order to better understand the development of children's toys and related electronic products, it is necessary to determine the current global trends and find the possible impact of these factors on user needs. Observing these trends helps to better identify and understand people's possible new needs.

### 1.1.1 Population growth continues and aging is increasing

The aging of the population may become one of the most important social trends in the 21st century. Almost all social fields are affected by it, including labor and financial markets, demand for goods and services such as housing, transportation, and social security, family structure, and generations relation.

Data from the "World Population Outlook: 2019 Revised Edition" shows that by 2050, one out of every six people in the world will be 65 years old (16%) or older, and this number will be 11 in 2019 (9%); by 2050, in Europe and North America, 1 in 4 people will be 65 years of age or older. In 2018, the number of people 65 years of age or older

in the world exceeded the number of people under 5 years old for an unprecedented rate. In addition, the population of 80 years or older is expected to triple, from 143 million in 2019 to 426 million in 2050.

The size and age structure of the population are determined by three major demographic processes: fertility, mortality, and migration.

Since 1950, life expectancy in all regions has increased significantly. With the increase in life expectancy at birth, the reduction in mortality among the elderly has an increasing impact on the overall life expectancy.

The decline in fertility and the increase in life expectancy are key factors affecting the aging of the global population, and in some countries and regions, international migration will also affect the changes in the age structure of the population. In countries experiencing a large wave of immigration, international migration will at least temporarily slow the process of aging, because immigrants are often young people of working age. However, immigrants who stay in the country will eventually become the elderly population.

The slowdown in global population growth and the rise in the median age will help some developing economies, but the rapid aging and shrinking of the population will put pressure on many advanced economies. Some developed countries and emerging economies, including Europe and East Asia, will accelerate their population aging and will face a shrinking population size, which will put pressure on economic growth. In contrast, some developing countries in Latin America, South Asia, the Middle East, and North Africa will benefit from a larger working-age population. If coupled with improvements in infrastructure and labor skills, they will have the opportunity to reap the demographic dividend.

### 1.1.2 Environmental degradation

In terms of the environment, the physical impact of climate change

may intensify in the next 20 years, especially in the 2030s. The rise in global temperature will lead to more extreme storms, droughts and floods, melting of glaciers and ice caps, and rising sea levels. This severe environmental impact will disproportionately fall on developing countries and poorer regions, and will be intertwined with environmental degradation, creating new vulnerabilities and exacerbating the economic development, food, water, health and energy of these countries and regions existing risks in security and other aspects. The government, society, and the private sector may expand adaptation and restoration measures to manage existing environmental threats, but these measures are unlikely to be evenly distributed and implemented, leaving some populations unprotected. In the future, there will be more and more debates about how and how fast to achieve net zero emissions of greenhouse gases.

82% of people worldwide believe that the climate change we are witnessing is largely the result of human activities, and this proportion is even higher in emerging markets that are witnessing large-scale industrial growth. At least two-thirds of people in every market believe that companies do not pay enough attention to the environment, and people expect organizations to actively promote sustainability plans and achieve transparency in organizational actions, greenwashing will no longer be able to meet people's requirements.

### 1.1.3 People are concerned about their own health and environmental protection

Ipsos data shows that nearly 90% of people want to become healthy. This ratio is even higher in China, Indonesia and other regions, and it has almost become a kind of unanimous concern. And 80% of respondents believe that correct diet is essential to good health. Compared with Generation Z, baby boomers agree with this view more. However, in terms of the relationship between food and the

environment, young people represented by Generation Z are more inclined to choose organic food and are more willing to prioritize the earth. This sentiment will continue to grow in the 1920s and beyond.
As concerns about environmental issues have intensified, people have established more and more connections between things that are "good for us" and "good for the earth." 63% of people worldwide are willing to pay higher prices for food that does not harm the environment. The choice of "organic", "natural", and "more vegetables and less meat" in life seems to have become a prominent phenomenon.

### 1.1.4 Focus on technological development

Since 2013, in the Ipsos survey, people's confidence in the ability of technology to change lives has increased from 73% to 77%. Globally, 70% of people try to keep up with the pace of technological development. The desire for the next generation and the latest technology is a key value.
About three-quarters of people worldwide agree that technology makes life better, 66% believe in "technological innovation" and believe that we need modern technology to solve future problems. This ratio is even higher among men, high-income groups, and residents of large cities.

### 1.1.5 Pursuit of "simplicity" and "meaning"

Simplicity is getting closer to a luxury for modern people. Globally, 63% of people want their lives to be simpler, 52% feel overwhelmed when faced with so many choices, and more than three-fifths want to slow down the pace of their lives.
Many studies have linked the use of social media to depression. The edited and speculated online life of others will cause us to be dissatisfied with our real life and produce a sense of "meaningless".

In the face of the complexity of the world and unprecedented pressure from all parties, it is a natural conclusion that people need to relax more than ever. But stress and depression are not new trends. The unprecedented development of technology will only produce slow and weak changes in our emotions, or even no changes. On the contrary, we are more capable of understanding and responding to these changes.

With the improvement of global living standards and the advent of more technologies and options, we may be forced to seek simpler and more meaningful things. So brands that can provide easy options to make life easier will continue to flourish in the 1920s.

## 1.2 Electronics trends

With the development of the times, electronic products have become indispensable things in people's lives. At the same time, with the development of technology, consumers have higher and higher requirements for electronic products. People hope that electronic products are smarter, smaller in size, and updated fastermore durable and so on.

Since the outbreak of the new crown virus in 2020, all aspects of people's lives have been more or less affected by the new crown epidemic, and changes in people's living habits will also affect the development of the consumer electronics industry to a certain extent.

### 1.2.1 All Things Connected

In the past ten years, the number of electronic products connected to the Internet has greatly increased. From watches to various household appliances, everything can communicate with users wirelessly through the Internet, and it is not just consumer electronic products, in many other fields, The Internet of Things is also ubiquitous and rapidly

developing, such as automobiles and medical equipment.

In recent years, automated home technology has also become more and more respected, especially since the outbreak of the new crown epidemic, people have been staying at home for longer, and higher requirements for the comfort of home life. Through automated home technology, people can easily use mobile phones or even voice to control almost all electronic devices in the home, such as controlling the temperature of the oven, adjusting the angle of the security camera, turning on or off the sweeping robot, etc., making family life easier and more comfortable.

In the future society, every person and every item is an "endpoint". The service of the Internet of Things must be extended to "end-to-end". As of 2022, it is estimated that there will be 50 billion smart connected devices. These devices cover a variety of forms. PC is just one of them. It also includes wearable devices, smart hardware devices, and even cars. Therefore, it's a very large and exploitable world.

## Example: Amazon Alexa

*Fig.1: Amazon Echo is a smart speaker equipped with the intelligent voice assistant Alexa sold by Amazon, image source: Amazon*

Amazon's Alexa digital assistant appeared on the original Amazon Echo smart speaker in 2014, and has since expanded to many speakers and other devices. If you use the native Amazon Echo speaker, you will get the best Alexa experience, but Alexa is now also appearing on many gadgets that don't have the Amazon label.

In addition to answering questions about the weather and schedule, Alexa can also contact the various smart home devices you have and let them talk to each other-for example, if you need to turn off all the lights in a room at the same time

Alexa's broad reach is a good reason to partner with Amazon to build a smart home platform: It's built into thermostats like the Ecobee4 and light switches like the Ecobee Switch+, and you can even use versions of it on TVS equipped with devices like the Fire TV Cube and Fire TV.

You can easily integrate your home into Alexa, allowing you to access all smart home controls via voice.

Amazon's assistants also use "skills" which is the term for voice control applications built for the system. For example, the TuneIn skill can play your favorite radio stations, the BBC News skill can read the latest headlines, and the Spotify skill allows you to pick your favorite tracks and playlists.

In terms of the number of skills it provides, Amazon beats other digital assistants, and this number has been growing.

For smart homes, Alexa can identify and control compatible devices on the home network. This is a more straightforward process than Apple's HomeKit: you just need to click "Add Device" in the Alexa app to do this, or use voice commands to let Alexa scan for new gadgets. The range of compatible kits is amazing and growing.

You can also create device groups: for example, by issuing a single voice command to Alexa, turn off all the lights downstairs. At the same time, the convenient Routines function is just like the Scenes function of HomeKit, you can automatically perform operations on multiple devices at the same time (perhaps turn off the lights and lock the door

at the end of the day).

You need at least one device with Alexa built-in to control everything else. It's also worth mentioning that for some Alexa speakers, such as the 4th generation Echo, you have a Zigbee hub, which means you don't need a hub from Philips or other companies (at least for basic functions)

## Example: Wal-mart Smart Retail

Fig.2

Some new retail scenes are popping up in Wal-mart's China stores: Customers take out their mobile phones in front of the shelves, scan the bar code on the back of a bag of potato chips or roast duck, and walk all the way to the exit of the checkout counter. Ignoring the "long queue", they take out their mobile phones and tap their fingers to quickly check out and leave the store through the "Scan & Go" channel. The whole process went smoothly. If you only buy one item, you can make a pleasant shopping in less than 3 minutes. This is the WeChat applet of Wal-Mart China's "Scan & Go". By solving the pain points of customers queuing to check out, and improving the shopping

*Fig.2 : A girl uses "scan&go" to shop at Walmart, image source: ifanr.com*

experience of customers, Wal-Mart's "Scan & Go" was launched in January 2018, and it has become the retailer's first mini program with tens of millions of users in a short period of time. As of early December 2018, the number of users exceeded 20 million, and the accumulated visits exceeded 820 million.

As early as the 1980s, Wal-Mart spent huge sums of money to purchase its own commercial satellites to achieve global networking. Since then, Wal-Mart has established a global retail big data network for the first time, cooperating with thousands of stores all over the world, automatically recording real-time data such as inventory, shelves, sales, transportation and ordering of each item, and docking all purchases and supplies. Integrate the entire upstream and downstream industrial chain, and do everything possible to reduce the cost of the entire supply chain, so as to lock the commodity at the lowest price.

In addition, Wal-Mart also first introduced radio frequency identification technology (RFID technology: Radio Frequency Identificatian, which is a technology that automatically identifies products for checkout without manual intervention) and a 24-hour logistics networked monitoring system to minimize logistics costs. As for all the saved costs, Wal-Mart chooses to benefit consumers, so as to truly realize "saving every penny for customers."

Today, in China where e-commerce and logistics are developed, online shopping and mobile payment have completely changed China's retail business ecology. For example, compared with RFID technology, Chinese customers are obviously more inclined to mobile payment. Compared with the long-standing credit card payment habits in Europe and America, mobile payment is irreplaceable. With the increase in offline rents and human resource costs, Wal-Mart has adopted an evolutionary path that is more adapted to China in recent years: Vigorously expand e-commerce and develop omni-channel retail, including cooperation with JD.com, Dada and JD Daojia in

channels, data, and logistics. In 2018, Walmart began in-depth cooperation with Tencent Smart Retail on shopping experience, marketing, payment innovation and membership system.

The reason why “Scan & Go” is fully launched is because this small program can connect Wal-Mart’s massive offline traffic, improve store operation efficiency, accumulate more digital users for Wal-


Fig.3

Mart, and provide customers with a personalized shopping experience lay the foundation. "Scan & Go" is essentially equivalent to a virtual shopping cart. Consumers can scan the barcode on the product through a small program to add the product to the "shopping cart", and then self-check through WeChat payment to generate an exit QR code without waiting for the whole process queuing to check out.

*Fig.3: A girl uses "scan&go" to check out at Walmart, image source: ifanr.com*

If you want to save more time, you can also place an order directly online and choose to deliver it to your home. On the one hand, Wal-Mart promotes the digital transformation of offline stores and expands the regional space for online order picking. On the other hand, it deploys its cloud warehouse network in areas where the stores cannot reach. Through the cooperation with

Fig.4

Dada-JD Daojia, as long as there is a Wal-Mart store or cloud warehouse within 3 kilometers of the area where customers are located, they can place an online order to purchase Wal-Mart products and deliver them home within an hour. At present, Wal-Mart China has established 38 cloud warehouses in Shenzhen, Shanghai, Chengdu and Beijing.

As the post-80s and post-90s have become the main consumers, more young people have joined the ranks of

*Fig.4 : The busy scene of Walmart cloud warehouse, image source: ifanr.com*

"vegetable baskets". Due to the large area of Wal-Mart's hypermarket stores, many people are "lost" when they go shopping. To this end, the Wal-Mart applet has specially launched the "Find Goods" function, which can not only help customers quickly find the location of the product in the store, but also search for the inventory of a certain product in nearby stores. More importantly, Wal-Mart can better conduct consumer data insights to meet the personalized needs of more customers through the data accumulated online such as "Scan & Go" and cloud warehouse. What customers browsed, added, searched, and finally purchased are summarized in the data terminal and fed back to help Wal-mart understand the consumption behavior of Chinese customers more deeply.

At the same time, the applet can also help the operation department reach users in a more precise way. For example, during the August 8 Shopping Festival in 2018, Wal-Mart distributed 12 million e-coupons across the country through "Scan & Go", which are personalized coupons tailored to different users' purchasing habits. The convenience of online coupon distribution and offline use has been loved by customers. In the first week of the August 8 Shopping Festival, Wal-Mart achieved a doubling of the number of customers who scanned it.

### 1.2.2 Further development of augmented reality (AR)/virtual reality (VR)

In the past few years, we have seen the rapid development of VR technology. AR and VR technologies have greatly facilitated people's lives and enhanced people's experience. Especially since the outbreak of the epidemic, people have had to stay at home to study, work, and entertain. This has once again strengthened the application of VR technology. People will use VR technology for remote shopping, remote learning, and games and sports at home.

When the world is blocked and isolated, an immersive, completely

three-dimensional virtual platform is the best alternative. It can allow isolated individuals to reconnect, complete writing collaboration, fill in the blanks in entertainment or business, and pin people's emotions.

## Example: Makeup Genius

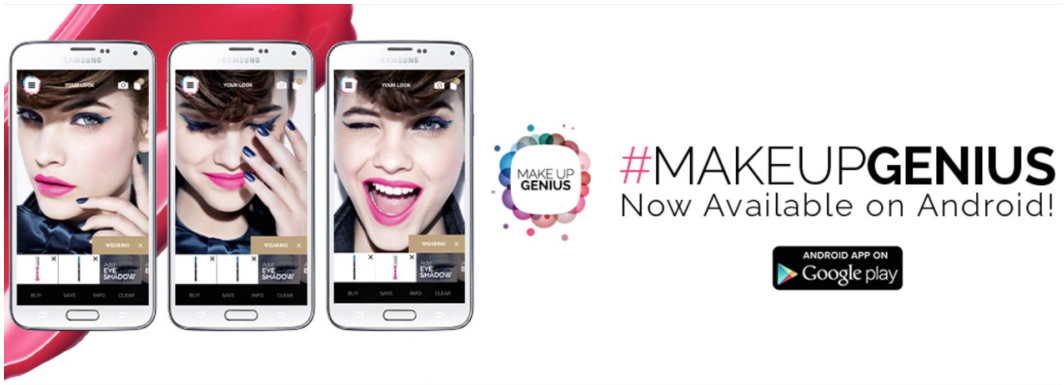



Fig.5

Makeup Genius, developed by Image Metrics, is a mobile application that allows customers to try cosmetics virtually before deciding to buy them.

The company claims that the technology uses facial tracking or facial motion capture, which is a computer vision technology that can determine image and video data by mapping 64 data points of facial landmarks in real time to determine head poses, facial expressions and different color. Thus, the cosmetics are displayed on the entire face of the mouth.

The company also claims that the app's facial recognition algorithm is trained to determine age, race, gender, facial hair and other attributes.

To use the application, the user must download the application from the Apple or Google Play store. From the interface of opening the APP, the application scans the user's face, and then prompts the user to select a product and apply the product and preview his face. The

*Fig.5 : Makeup Genius App, image source: Pinterest.com*

catalog includes lipsticks, eyeshadows, eyeliners and foundations, and toning products. The app also provides a complete makeup look that users can try and refer to.

The company said that in the L'Oréal store, shoppers can choose to scan the actual item to display it on the screen, and then make a virtual attempt without using a product tester.

According to the case study of L'Oréal, real-time customer data training was also conducted on the algorithm to provide relevant suggestions. For example, if a customer has been researching "smoky eye" makeup, the app will show more products that can be used to create smoky eye makeup.

Image Metrics claims that the app has been downloaded 35 million times, and although the actual numbers have not been released, it still improves customer experience, engagement and loyalty.

## Example: Snapfeet


Fig.6

*Fig.6 : Snapfeet App , image source: snepfeet.io*

Trya Srl created Snapfeet (mobile app), which claims to enable shoppers to wear shoes virtually based on 3D biometric scans of their feet. According to the company, after scanning shoppers' feet, the app can recommend shoe sizes and models that best suit customers.
Using photos of customers' feet taken from multiple angles, the biometric feature of the app will create 3D images of the feet. After saving the image in the app, its algorithm will arrange the image and send a notification when the biometric is ready.
Trya claims that the app will refer to these biometric measurements every time a user logs into the store to make a purchase.
The application can be downloaded from the Google Play store. A Snapfeet business application is also provided to the company's retail partners.
The company has not provided any case studies, but claims that most of its customers are located in the Riviera del Brenta and Marches regions of Italy. The company's website reports that one of its footwear retail customers is Spider Shoes.

### 1.2.3 Equipment miniaturization and diversified functions

Electronic technology is a new technology developed in western developed countries at the end of the 19th century and the beginning of the 20th century. It developed the most rapidly in the 20th century and became an important symbol of the development of modern science and technology.
In 1946, the world's first computer ENIAC came out. It was a behemoth that used 18,800 electron tubes, covering an area of 170 square meters and weighing 30 tons. In the short forty years since the advent of ENIAC, the development of electronic computers has been extremely rapid. The computer has undergone four generations of changes and developed into what it is now. In this process, its size has

become smaller and more powerful. While witnessing the development of science and technology, it also provides strong support for the progress of mankind.

Not only computers, but with the introduction of various electronic devices from generation to generation, ordinary consumers have higher and higher requirements for electronic products. People expect to use more portable electronic products with more diversified functions to meet their needs.

## Example: TV

Televisions have experienced rapid development from black and white to color, from tube and transistor televisions to integrated circuit televisions. At present, televisions are moving towards intelligence, digitization and versatility.

In 1923, British scientist John Baird invented the first

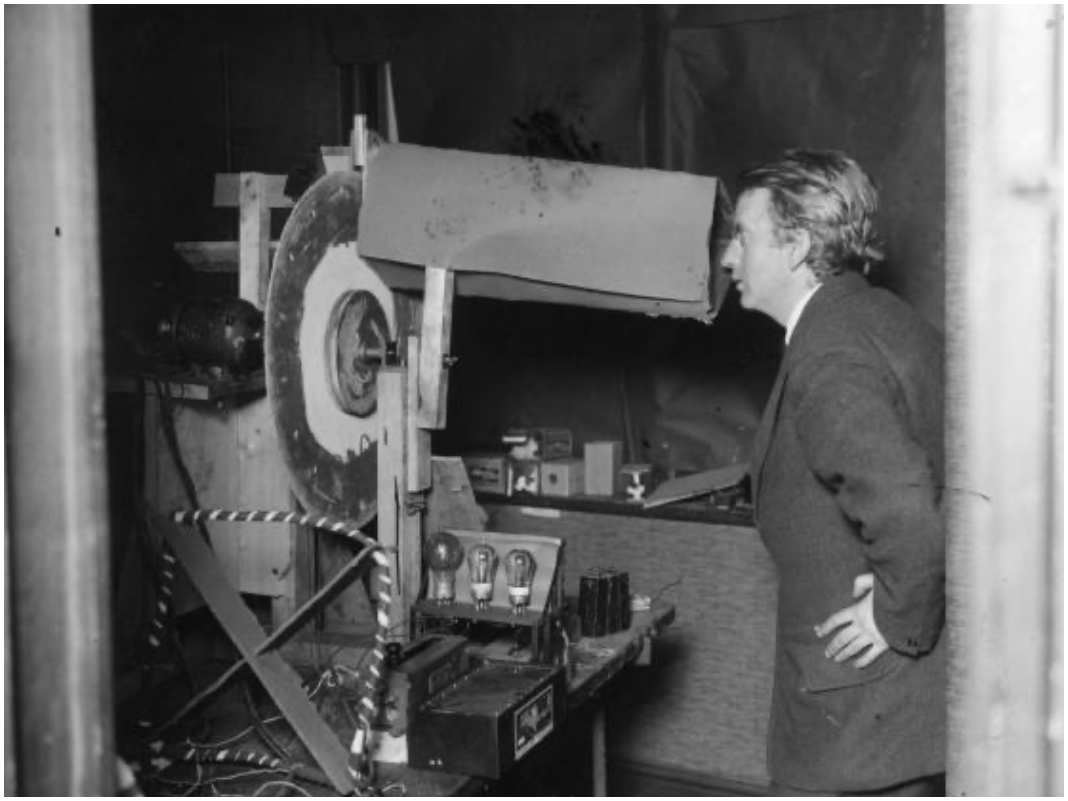


*Fig.7: John Baird and his invention of the television, image source: Google Image*

mechanical scanning TV based on the principle of Nipkov's disc. This TV set was basically made of waste materials. The optical equipment is the lens of some bicycle lights, the frame is made of enamel pots, and the wires are improvised, messy spider web-like things. But compared to the current TV set, it is also a huge monster.

After Baird invented a television device that can map images, this technology quickly developed by leaps and bounds. In 1939, the first black-and-white television was born in the United States. At that time, televisions had small screens and large body, various rotary buttons on the fuselage make the fuselage look bigger.


Fig.8

And now, LCD TVs have become very common. It has repeatedly reduced the volume of internal electronic components, and the body has only a thin layer. Except for the screen, other electronic components take up almost no space. There is even a flexible screen TV that can be completely rolled up like a scroll, which greatly reduces the total volume of the fuselage while increasing the screen size.

*Fig.8: A lady and an old-fashioned TV, image source: Google Image*

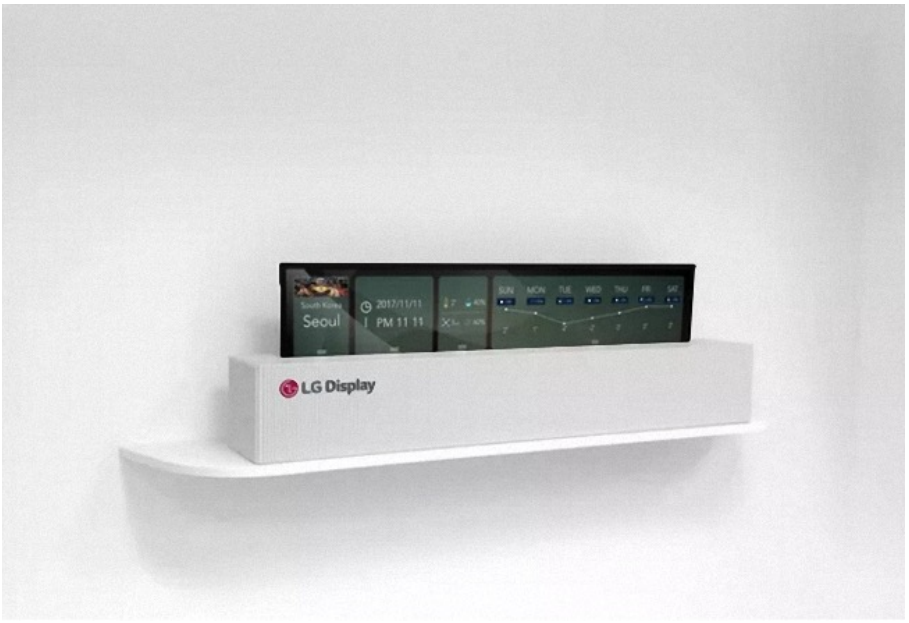



Fig.9

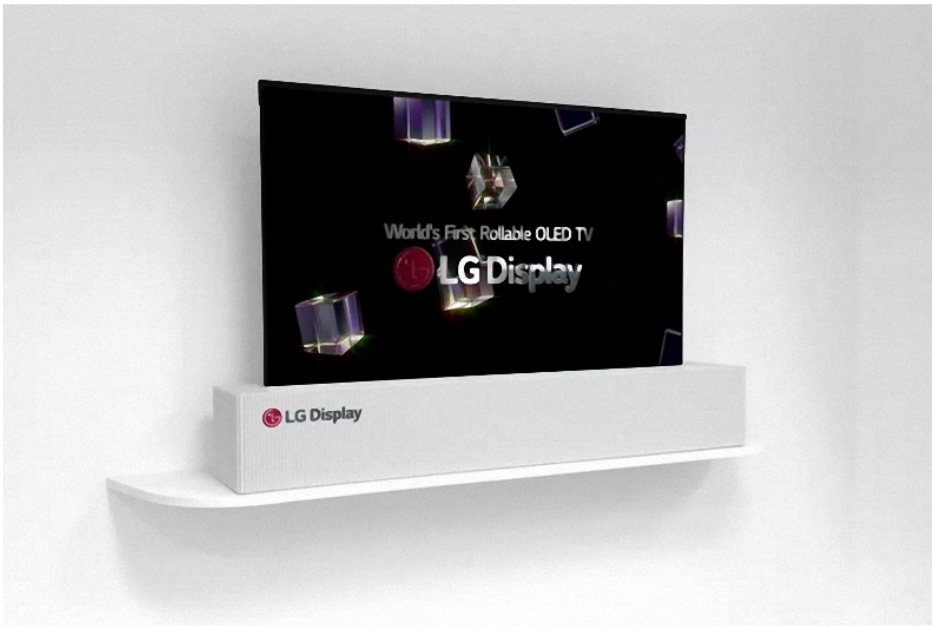



Fig.10

*Fig.9 : LG curved screen TV is unfolding , image source: Google Image*
*Fig.10 : LG curved screen TV fully expanded state , image source: Google Image*

# 1.3 Children's toy trends

According to the survey and analysis of Fortune Business Insights, the global toy market in 2019 was US$105.85 billion.

The pandemic of the new crown has had a further positive impact on the children's toy industry. According to a survey by the American Toy Association, after a historic year, because millions of families were trapped at home, the sales of toys in the United States soared. According to the forecast of the Australian market research team PLAY MR, the global toy market is expected to grow at a compound annual growth rate of 4.5% from 2019 to 2024. It is estimated that by 2023, revenue from the toy market alone will exceed US$120 billion.

## 1.3.1 Children switch from physical toys to video games at an early age

With the rapid development of technology, the cost of electronic products has gradually decreased. Compared with physical toys, an electronic product can provide very rich game functions, which makes children switch from toys to games at an earlier age. This means that the target age group for single-function toy manufacturers is shorter, and electronic games are beginning to take center stage.

In the UK, recent results show that 52% of children aged 3-4 and 82% of children aged 5-7 are online (Ofcom, 2019[14]). Children usually experience digital technology for the first time before they are two years old (Chaudron, Di Gioia and Gemo, 2018[15]).

According to a survey in China in 2019, only 35% of the interviewed parents said they had not bought new technology toys. Among the new technology toys that the interviewed parents have bought, 31% of the interviewed parents have bought artificial intelligence toys and virtual reality toys. Many parents buy artificial intelligence toys, which is believed to be related to the promotion of such toys as being able

to accompany and assist their children in learning at the same time. One parent interviewed said: "Artificial intelligence toys can teach children to sing some nursery rhymes or recite some poetry, but family members are not as professional as recording." Another parent said: "Artificial intelligence toys can communicate with children. In this way, sometimes When parents cannot accompany their children, children can also play with toys." The higher the monthly household income, the more parents buy new technology toys. Households with a monthly income of RMB 20,000 or more have a higher proportion of purchasing new technology toys than other income groups.

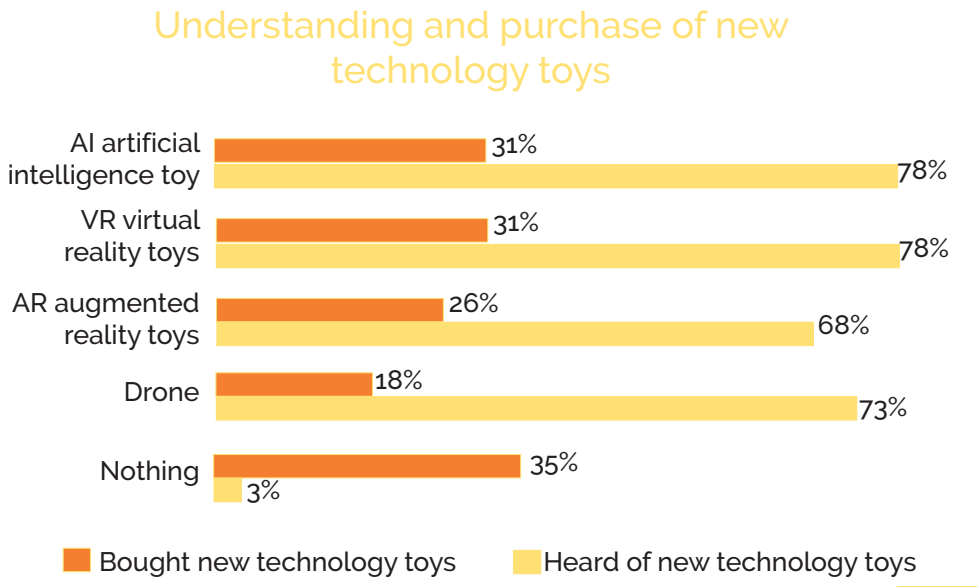



Fig.11

## 1.3.2 Educational, interactive and multifunctional toys

Education has once again become the focus of the trend of children's toys. Parents are looking for innovative ways to help children develop skills, which requires toys to be more functional and interactive. For example: Multifunctional toys that cultivate children's STEM skills (science, technology, engineering, mathematics) are increasingly sought after by parents.

*Fig.11 : A survey on the purchase and understanding of new technology toys in 2019*


Fig.12

According to Arizton's report on the stem toy market, by 2025, the global STEM toy market will exceed 9.5 billion U.S. dollars, growing at a compound annual growth rate of 7% during the forecast period. Market analysis predicts that the industry will experience a 1.5-fold growth during the forecast period. The market is expected to grow significantly due to the emergence of robotics, STEM-based courses, cognitive and psychological development needs, and millennials' nostalgic spending. However, due to the rise of sustainable practices in the global STEM toy market, the market is moving in the direction of sustainable growth. Manufacturers, distributors, retailers and buyers are all paying attention to this concept.

*Fig.12 : Toys , image source: pexels.com*

During the forecast period, the segment of the 8-12 age group is expected to become the fastest growing segment, with a compound annual growth rate of more than 7%; high-end construction and engineering, circuits and power, DIY projects, robots and coding, The increasing popularity of artificial intelligence and sensor-based interactive toys is increasing the growth of the market for those over 12 years old; it is estimated that online channels are the fastest-growing distribution agency during the forecast period, with a compound annual growth rate of 7.56%; by 2025, due to increased interest in scientific and educational toys and e-learning, rapid adoption of high-quality products, and increasing preference for sustainability, the European STEM toy market is expected to reach a revenue share of more than US$2 billion and environmentally friendly materials.

## 1.3.3 Have fun together

Toys help families rediscover the joy of spending time with their families during the COVID-19 pandemic. As the new crown epidemic continues, families will seek new toys that promote unity, as well as inclusive toys that children of different abilities and interests can enjoy.

### Example: Switch game console

Nintendo Switch, referred to as NS, is a console released by Nintendo in March 2017. It adopts an integrated design of home and handheld. It can be connected to a TV, put on a table with its own stand or handheld; it supports single or multiple use, and can also be connected to accessories to expand its functions. It is also equipped with a variety of games in different categories and suitable for different groups of people for users choice, so it becomes a good choice for leisure and entertainment with family and friends or for self-entertainment.

Fig.13

Throughout 2020, many people were trapped at home due to the epidemic and were bored, but Nintendo was lucky. Because of the epidemic, the company's switch game consoles were selling well. According to the information released by the company in August 2020, their operating profit for the quarter increased by 428% compared with the same period last year. Although analysts expect Nintendo's performance to be very strong-Nintendo's Switch console is very popular during the epidemic lockdown, but this increase is still 40% higher than S&P Global Market Intelligence's most optimistic estimate.

"Animal Crossing: New Horizons" is especially popular with the public. In this explosive game, players can build their own islands and buy and sell rutabaga. The game has sold 22.4 million units since its launch in March 2020 to August, setting the second highest sales record in the history of the Switch console.

*Fig.13 : A girl is playing Nintendo Switch , image source: pexels.com*


Fig.14

The popularity of this game in turn drove the sales of consoles: Nintendo sold 5.68 million Switches in the quarter ended in June. This was achieved when the supply interruption caused production delays during the epidemic and many places sold out of stock.

*Fig.14 : "Animal Crossing: New Horizons" interface , image source: Google Image*

# 2. Parental psychology

In terms of parents' psychology, the psychology of parents is mainly analyzed from two aspects. The first aspect is to analyze the concerns of parents in the process of raising and educating their children, including concerns about their children's mental health, concerns about the impact of external things on their children, and lack of confidence in their own parenting ability. The second aspect analyzes the differences between Chinese and Western family education and parental psychology, which helps to understand the needs of users for products under different cultural backgrounds.

## 2.1 Parents' worries when raising or educating their children

In the process of children's growth at different stages, parents may have a certain degree of concern about the child's physical, psychological, learning ability, social skills, etc., and a correct analysis of the parent's psychology and the parents' concerns about the child's problems will help. Better understand the needs of parents for children's products, because to some extent, children's products must not only meet the needs of children, but also meet the expectations of parents for children's products, because parents are the real buyers of children's products.

### 2.1.1 Worry about the child's mental health

A national WebMD survey in the United States found that parents view school and friends as the biggest source of stress in their

children's lives. The survey also found that 72% of children have negative behaviors related to stress, and 62% of children have physical symptoms related to them, such as headaches and stomach pains.

Like adults, children also experience psychological pressure due to various things. Sometimes children experience psychological pressure even stronger than adults, because they may not be able to accurately perceive and express their pressure.

Compared with adults, children may be more sensitive. They may not only feel stressed by the things that happen in their lives, parents' work troubles, relatives' illnesses, or even disturbing images seen on TV, or hearing about natural disasters, wars and other topics can also cause children to worry about their safety and the safety of those around them, which can cause psychological pressure.

When aware of children's pressure, parents will also feel pressure to a certain extent, but parents should maintain positive communication with their children while ensuring that they are in a good mood, creating a relaxed family atmosphere for their children and helping them. Adhere to healthy work and rest habits. If your child's stress is severe enough, you should also seek help from a psychologist in time.

### 2.1.2 Worried about the impact of cybersecurity issues on children

Digital technology is a necessity in daily life. As new technologies penetrate and change lives in the 21st century, the way people work, learn, and communicate has changed. Children of this era are exposed to digital technology at birth and are the most frequent users of emerging online and digital services (OECD, 2016[3]).

Time spent online is related to potential risks and rewards. On the one hand, it provides children with opportunities to express themselves, learn and strengthen friendships. On the other hand, the Internet also exposes children to risks such as harmful content and cyberbullying

(Livingstone et al., 2017)., 2011 [4]).

Fig.15

The number of children who can access the Internet and use various digital devices at home has been steadily increasing. From 2006 to 2015, the proportion of 15-year-old children surfing the Internet at home in OECD countries increased from 75-95% (OECD, 2017[7]). Similar results have been seen in 28 households in the European Union (EU), where Internet access increased from 55% in 2007 to 87% in 2017 (Eurostat, 2018 [8]). It ranges from 98% of households in the Netherlands with Internet access to 67% in Bulgaria, the EU member state with the lowest Internet access rate. Compared with families without children, families with dependent children are more likely to access the Internet (96% vs. 82%) (Eurostat, 2017 [9]).

International trends indicate that young children

*Fig.15 : Children may be harmed by the Internet , image source: Google Image*

are increasingly using digital technology, and the age of first use is declining (Hoft Grafland, 2018 [13]).

Many parents worry that children's physical and mental development is not sound enough, and they do not have strong judgment and self-control. They are easily affected by harmful content on the Internet, which will have a certain impact on children's mental health.

## 2.1.3 Worry about children's healthy diet and insufficient exercise

Many parents believe that with the continuous growth of children and the proliferation of over-processed foods in cities and even remote areas, children can come into contact with more and more unhealthy foods. The main reasons for this phenomenon include the influence of improper marketing and advertising, as well as the increasing supply of fast food and high-sugar beverages, making children's preference for high-sugar and high-fat foods increasing.

As a result, the problem of overweight and obesity in children and adolescents has gradually developed into a global problem. Between 2000 and 2016, the overweight ratio of children and young people aged 5 to 19 rose

*Fig.16: Little boy holding healthy green vegetables in hands, image source: pexels.com*

from one-tenth to nearly one-fifth, which was 10 and 12 times the obesity ratio of girls and boys of the same age group in 1975.

The State of the World's Children 2019: Children, Food and Nutrition stated that at least one-third (more than 200 million) of children under five are undernourished or overweight. Nearly two-thirds of infants and young children between the ages of six months to two years old cannot ensure the rapid development of their bodies and brains. These children may face various risks such as poor brain development, poor learning ability, low immunity, susceptibility to infection and even death.

According to a survey by the World Health Organization, four-fifths of young people in the world lack exercise. This has led to a series of physical and psychological problems in children such as childhood obesity and childhood myopia. It may affect the normal development of children. Of course, nowadays urbanization has reduced the space for children's outdoor activities, and it also has a certain impact on the amount of exercise for teenagers.

Therefore, things related to children's healthy diet and children's outdoor sports are gradually attracting the attention of parents.

## Example: Wello


*Fig.17: Wello app interface, image source: Google Image*

An application called Wello, which gives some dietary advice in the form of games, allows parents to more clearly understand the amount of each food required by the child, and can also increase the child's interest in healthy food, after all, healthy foods are not as attractive to children as high-calorie foods.

## 2.1.4 Worried about not having enough time with the child

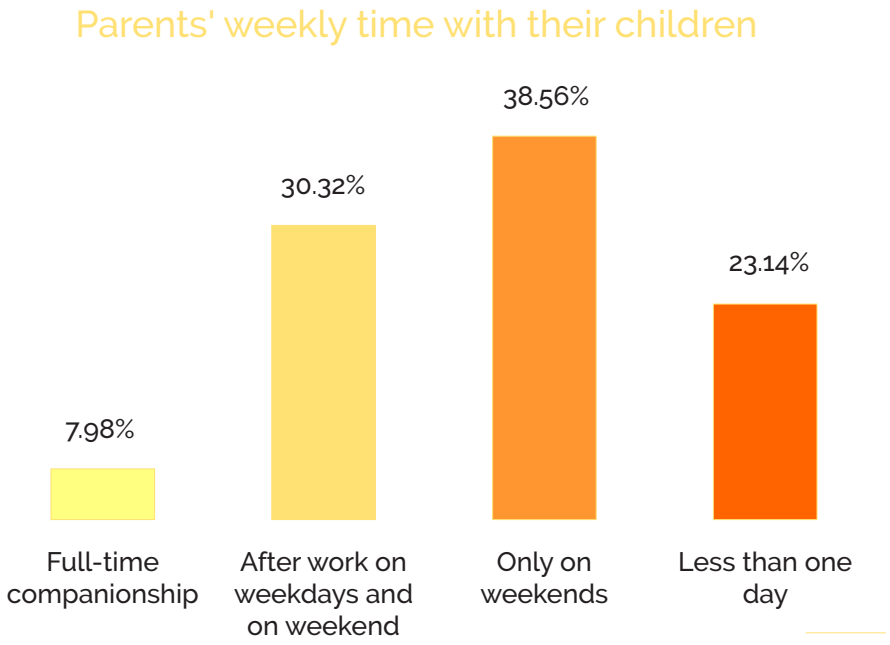



Fig.18

With the rapid economic development, the post-80s generation has become the main force of parents, and the society pays more attention to the company of children and healthy growth of children. However, the huge work pressure and fast-paced life gradually deprived parents of the right to accompany their children. According to the "Chinese Urban Parent-Child Companion Survey", only one-third of parents have enough time to accompany their children. The growth and education of Chinese children has aroused widespread concern in society. The "Chinese Urban Parent-Child Companion Survey" covers China's coastal, central and southwestern regions, and attracted 3681

*Fig.18 : Data from "China Parent-Child Companion Survey"*

parents. Among them, 15.9% were born in the 70s, 57.2% were born in the 80s, and 26.9% were born in the 90s. Parents of children aged 0~1 accounted for 12.9%, parents of children aged 1~3 accounted for 16%, parents of children aged 3~6 accounted for 43.8%, and parents of children aged 6~12 accounted for 27.3%.

Among the people surveyed, 70% of parents have no time to accompany their children. The accelerated pace of urban life has reduced the number of full-time parents, accounting for less than 10%. 20% of parents said they have no time to accompany their children at all and only 30% of parents can guarantee enough time to accompany their children.

According to research, children who lack the company of their parents are likely to be poor at communication and will not actively communicate with their parents when they encounter problems; they lack a sense of security and do not know how to deal with bullying; because they see other children often accompanied by their parents, they are envious, and over time they will develop inferiority complex and other psychological problems.

The progress of social civilization has made it easier for parents to obtain correct parenting information, which has improved parents' awareness of accompanying their children, but at the same time, parents who have no time to accompany their children have a certain degree of companionship anxiety. In order to make up for the lack of companionship for their children, many parents will choose to sign up for interest classes for their children or purchase early education products with accompanying functions.

According to the "Chinese Urban Parent-Child Companion Survey", the expenses of parents on their children are mainly reflected in daily expenses such as meals and clothes; early education classes or products with companion functions; and parent-child outings. Among them, early education courses or products with accompaniment function spend the most, accounting for nearly 50%.

## 2.1.5 Parenting Anxiety

Concerning parenting anxiety, it mainly occurs in China and is closely related to China's social environment. Because now the parents of the post-80s and 90s have become the main force of the parents, and at the same time, the post-80s and 90s are the first batch of only children in China. Their parents and grandparents have too many expectations of them. The expectation continued, and was further amplified, forming a kind of collective 'nurture anxiety'. "Nurturing anxiety" has become an entry on "Baidu Baike" (a website similar to "Wikipedia" in China), which shows that "nurture anxiety" has become a social problem in China.

The source of the " nurture anxiety" is mainly due to intergenerational rearing and excessive early education.

A questionnaire survey titled "Double Only Child Marriage" showed that more than 70% of "double only child" young parents "only gave birth but not raised" and left their children's upbringing to both parents. Among them, 42.1% of the children were taken care of by grandparentsfather's parents, 29.8% were taken care of by grandparentsmother's parents, and only 15.8% were taken care of by their mothers, others were taken care of by the whole family. One is that because the only child lacks experience in taking care of younger siblings, they may be at a loss when the child is born, so the grandparents of the child take on the heavy responsibility of raising the child. The most important reason is that because of the fierce competition in modern society, many young parents have to sacrifice the time of accompanying and educating their children for work, and there is no sufficient time to take care of their children. And most grandparents are too doting on their children, and it is easy to develop the habit of children's arrogance and willfulness. In this case, parents and grandparents may have differences in the way of education, and at the same time the parents will not raise children. At this time, "nurture anxiety" arises.

Excessive early education is the product of a vicious circle caused by "nurture anxiety". Because modern parents are under pressure from their grandparents, their expectations of their children have further expanded. At the same time, there is pressure to see that other children are receiving early education, so excessive early education has appeared.

Some children start to learn literacy and arithmetic at the age of one. In family education, 78.1% of parents said that they spend the most energy on their children's intellectual development and knowledge education. In the family education of the only child, parents have the tendency of over-concerning, worrying, and mentoring their children's daily life, study, thoughts and behaviors. Forcing children to change their living habits will make them feel at a loss, and restricting children's freedom of movement too much has virtually become a kind of "psychological abuse." Although the so-called "psychological abuse" is not deliberately done by parents, when excessive early education becomes a reality, it will inevitably come at the cost of deducting children's sleep, reducing play time, and restricting social interaction. This is actually a hidden deprivation of children's right to health.

## 2.2 The difference between Chinese and Western family education and parental psychology

Family education is one of the components of education and the foundation of school education and social education. Family education is lifelong education. It starts at the birth of a child, even starts at the fetal period. Family education in the infant and toddler period plays a very important role in a person's life. After children go to school, family education is not only the foundation of school education, but also the supplement and extension of school education.

There are significant differences in family education between China and the West. Different concepts and training methods have caused obvious differences in personality and behavior habits of Chinese and Western children, and will also affect their personality and behavior habits when they grow up. In the institutional structure of Chinese and Western societies, the status and role of the family system are very different. This is a basic reason for the differences between Chinese and Western societies and cultures.

## 2.2.1 Different educational tendencies

Chinese parents value social education and doesn't pay attention to children's growth. Chinese parents attach great importance to the education of social adaptability, but they often neglect to promote their children's growth based on the characteristics of their children's physical and mental development. They often train children in accordance with established or commonly used models and pave the way for their future development. However, children trained in this way of education tend to lack their own characteristics and creativity.
Western parents pay more attention to providing their children with a growth environment that they can fight against, and to develop their tough characters and good conduct. According to social changes and their children's physical and mental characteristics, they constantly adjust and choose the concepts and methods of cultivating their children.

## 2.2.2 Different family education values

Chinese family education is deeply influenced by traditional Chinese culture. Traditional Chinese Confucian culture for thousands of years emphasizes "cultivating one's moral integrity, coordinating the family, governing the country, and peace of the world". Under the

influence of this culture, family education has been given direct social significance. At the same time, China Traditional culture also regards parental education and children's personal growth and achievement as directly related cause and effect. Therefore, Chinese parents attach great importance to people's views on their educational methods or educational achievements, and they think that children are well educated or capable are their achievements, the poor education of children is the fault of the parents and will be discussed by others.

Western parents believe that education is for children's better survival, and has nothing to do with others. It is to shape children's correct character and three views. There is no utilitarian mentality when educating children.

### 2.2.3 Different levels of respect for children

Chinese parents are more possessive, and they treat their children as their own private property and as their appendages. They tend to educate children in the right way they think, neglecting the relationship between children and adults and does not respecting children's personal rights, leaving children in a passive position.

Western civilization emphasizes equality, regards children as the main body, and respects children's individual rights. Western parents treat their children as equal members of the family, respect their children's personality and dignity, and allow children to think independently and choose freely. Respect children's rights, do not engage in compulsory education, and advocate that children develop their nature and develop naturally. The responsibility of parents is only to develop and guide their children's interests and potentials, to create a favorable environment for their children, to value communication with their children, and pay attention to mutuality in family education.

### 2.2.4 Different focus on education

Traditional Chinese culture attaches great importance to morality, so Chinese parents always regard morality as the highest value orientation in education. Good children in the minds of Chinese people are first of all obedient and sensible children, who are loved by everyone. Therefore, parents cultivate children to be self-contained, pay attention to subtlety, and emphasize hierarchical concepts.
Western families focus on inspiring children's curiosity and imagination about nature. Creativity comes from curiosity, so through curiosity about nature, children's huge imagination can be stimulated, which can produce great creativity. They take the child's psychological development as the highest point.

In general, Chinese and Western family education has its own merits, and they are all based on their own traditional culture. With the progress of society and the rapid development of information technology, Chinese family education methods have gradually merged with the West. Chinese parents have gradually begun to pay attention to children's quality education rather than just the cultivation of abilities such as language and arithmetic. At the same time, more attention is paid to children's human rights, and children gradually have the right to speak in the family.

# 3. Children's characteristics and needs in the process of physical and mental development

This part analyzes the five most important areas for the development of children aged 3-6 from health, language, society, science, and art, and analyzes the needs and characteristics of children in developing abilities in these five areas.

## 3.1 Healthy

Health refers to a person's good state of physical, psychological and social adaptation. The infant stage is a period of extremely rapid physical and functional development of children, and it is also an important stage for forming a sense of security and optimism. A good body, happy mood, strong physique, coordinated movements, good living habits and basic living abilities are important signs of children's physical and mental health, and they are also the basis for learning and development in other fields.

In order to effectively promote the physical and mental health of children, adults should provide children with reasonable and balanced nutrition, ensure adequate sleep and appropriate exercise, and meet the needs of children's growth and development; create a warm

interpersonal environment so that children can fully feel the affection and care, and form life ability and civilized lifestyle that benefit from life-long period.

## 3.1.1 Healthy mental state

In order for children to form a healthy mental state, parents must create a warm and relaxed psychological environment for children, so that children can form a sense of security and trust; and help children learn to express and control emotions appropriately. The psychological state of children suggested by experts is as follows: Children aged 3 to 4 should have a stable mood, and rarely cry over a little incident; when there is a strong emotional reaction, they can gradually calm down under the comfort of adults. Children of 4 to 5 years old should be able to keep happy emotions often, and ease quickly when unhappy; when there are stronger emotional reactions, they can gradually calm down under the reminder of adults; willing to tell their own emotions to people close to them, share happiness or seek comfort together. Children aged 5 to 6 should always maintain a happy mood, know the cause of their own emotions, and work hard to relieve them; express their emotions in a moderate manner, not lose their temper;able to change emotions and attention with the needs of the activity. As mentioned earlier, with the increase of social pressure, parents now have long working hours and high work pressure, and there is little time available for children. At the same time, children's mental health is also a very important aspect of children's growth. In recent years, "accompaniment" has become a high-frequency vocabulary in the children's products market. Many companion robots and other intelligent products have emerged at the historic moment, and even companion-type water cups and school bags have appeared.

Fig.19

For example, the plush toy that each of us has played with when we are young is one of the most traditional companion children's products. It plays a very important role in the development of children of all ages. They provide many benefits, and in some cases, they play a huge role in making children feel safe and comfortable, allowing them to spend many of the most challenging moments in life.

## -Relieve anxiety and stress

One of the biggest functions of plush toys is to help child complete the process of self-soothing. Embracing plush toys provides great comfort for children who need help to calm down or feel comforted. Sometimes my mother is too far away to hug, but the familiar stuffed toy with the smell of home is really a good stand-in! A good example is a child taking their stuffed animal to school. This may help them to separate from their mothers and reduce separation anxiety, because knowing that they can hug familiar toys can bring great comfort to any

*Fig.19 : Some plush toys , image source: pexels.com*

child this teaches children to comfort themselves when they cannot turn to their mothers for help. Hugging or stroking a plush toy can immediately relieve the stress of an anxious child.

**-Promote children's imagination and communication skills**

The child's world is a world full of imagination. Children design the best, wildest, and most exciting stories, and can perform them with their toys. Parents and friends may be reluctant to take part in a fake moon trip, or to participate in a 3-hour tea party that constantly changes clothes, but child's plush toy is very willing to participate in all these action-packed fun. Children become very creative when they play with their stuffed toy friends. They often play roles and become toy carers, teachers or healthcare professionals. When children are able to divorce reality and allow their thoughts to develop more creatively in the fictional world, the world will take on a new form.

**-Learn to care and sense of responsibility**

Child's beloved stuffed animal toys also play a vital role in their growth and also play a key role in teaching them how to be caring and responsible children. By taking care of precious stuffed animals, children are learning how to be responsible for the things they care about and value in life. If your children don't want to lose their beloved toys, they will quickly learn to pick them up before leaving school or getting off the car, and they will find creative ways to carry them with them and keep them safe. Although other toys may be overlooked if they are considered disposable, the relationship between your child and the plush toy teaches them to take good care of the things they want to keep in their lives and be responsible for them.

## 3.1.2 Movement development

Have a certain balance ability and agile coordination of movements. This means that parents need to encourage their children to use a variety of activities to develop physical balance, coordination and flexibility, such as walking a balance beam or walking in a straight line, hopscotch, stepping on stilts, climbing, climbing, throwing, etc.

Experts suggest that, generally speaking, children aged 3 to 4 need to be able to walk a certain distance along the ground in a straight line or on narrow and low objects; be able to alternate up and down the stairs with their feet flexibly; be able to run forward continuously with both feet physically and steadily; can avoid the collision of others when scattered running; can throw the ball up with both hands. And 4 to 5 years old children need to be able to crawl; be able to jump over a certain distance or jump over objects at a certain height; be able to chase, dodge, and run with other people the game; can continuously throw and catch the ball. For children aged 5-6, they need to be able to walk smoothly on slopes, bridges and objects with a certain interval; be able to safely climb climbing frames with both hands and feet; be able to avoid obstacle; able to skip rope continuously.

At the same time, the flexibility and coordination of the hands are also very important. Parents need to create some conditions for the children to promote the exercise of the children's hand flexibility. For example, provide some tools such as brushes, scissors, paper, plasticine, or use some common materials and waste items in daily life to carry out manual activities to exercise children's hands-on ability. Encourage children to help with housework and use tableware to eat by themselves. Activities such as dressing themselves can also greatly help the development of children's hands and exercise their ability to take care of themselves in life.

Children aged 3 to 4 can generally paint with a pen; eat with a spoon by themselves; cut straighter lines with scissors. Children from 4 to 5 years old can trace some simple shapes or cut out simple shapes along the

Fig.20

edges; use chopsticks to eat. Children aged 5 to 6 need to be able to draw graphics by themselves, and the lines are basically smooth; be able to use chopsticks proficiently; be able to cut out simple shapes composed of curves along the edges, the edges are consistent and smooth; be able to use simple labor tools or utensils.

There are many toys for training children's hand flexibility. Since infancy, there have been some toys that train babies to grasp and hang beside the crib. These toys often train children's grasping ability, but also increase the baby's hearing, vision, and touch are trained, so they are often bright in color, can make different sounds, and are made of some elastic and safe materials. When children are a little older, there are more toys related to training hand skills, such as origami, paper-cutting, drawing, puzzles, building blocks and so on. In fact, there are many toys on the market now. They can cultivate multiple abilities of children, not only one ability. For example, Gravity Maze is one of ThinkFun's most popular children's toys and the winner of the 2017 toy of the year in the professional category. This is a gravity-driven maze game with 60 challenges of increasing difficulty. From beginners to experts, for children who like puzzles, smart games and challenging

*Fig.20 : Baby grasping , image source: pexels.com*

activities prepare great toys. Gravity Maze is educational-it aims to develop critical thinking skills and integrate with STEM subjects such as science and engineering. On the basis of cultivating children's hands-on ability, it also cultivates children's logical and spatial reasoning abilities.


Fig.21

## 3.1.3 Living Habits and Living Ability

### -Have good living and hygiene habits

Let children maintain a regular life, develop good work and rest habits, to go to bed early and get up early, take a nap every day, eat regularly, eat a good breakfast, etc. Let children develop good eating habits, arrange meals reasonably, and develop the habit of eating regularly and quantitatively; understand the nutritional value of different foods, and guide children not to be partial or picky, eat less or not eat food that is not good for health; more Drink pure water and drink

*Fig.21*: *Gravity Maze*, *image source: Amazon*

less beverages; Do not urge children too much when eating, remind children to chew slowly when eating, and not to play while eating. Help children develop good personal hygiene habits, such as brushing in the morning and evening

### -Have basic self-care ability

Encourage children to do what they can, and affirm their efforts and attempts; help children learn and master the basic methods of self-care, such as: wearing clothes and footwear, washing hands and face, etc.; provide conditions that are conducive to children's self-care , Such as: provide some boxes for children to pack and store their toys, books or daily necessities; children's clothes, shoes, etc. should be simple and practical, easy to put on and take off.

### -Have basic safety knowledge and self-protection awareness

Parents should create a safe living environment for children and provide necessary protection measures, such as placing props, medicines and other dangerous items out of reach of children, and setting up safety protection measures on balconies or windowsills. Take care of children in public places, have adults accompanied when riding in cars and elevators, and do not leave children alone at home or in cars, etc. At the same time, safety education should be given to children based on the actual conditions of life. For example, when going out, remind children to follow adults closely, not to walk with strangers, not to eat things given by strangers, to walk on the sidewalk, and to check vehicles when crossing the road. Help children understand unsafe things in the surrounding environment, stay away from power sources, fire sources, and try to avoid using dangerous knives, etc. Teach children simple ways to save themselves. Such as:

keep in mind your home address, parents' names and contact information; find the police when you encounter difficulties; keep in mind the fire alarm, hospital emergency and police telephone numbers, etc.

Regarding the development of children's living habits and abilities, the guidance of parents and teachers is the main focus. There will also be some books and video materials to help children learn this knowledge better. For example, the Lulu Life Habit Formation Toy Book series published by Bloomsbury Publishing House in the United Kingdom helps children develop good life habits by telling the good life habits of a little girl Lulu, and also uses as many as 26 crafts and materials. Allow children to train a variety of hand movements such as pulling, turning, touching, and tying while reading.


*Fig.22：Lulu Life Habit Formation Toy Book，image source: JD.com*

## 3.2 Language

Language is a tool for communication and thinking. Childhood is an important period for language development, especially oral development. The development of children's language

runs through all fields and has an important impact on the learning and development of other fields; while children use language to communicate, they are also developing their interpersonal skills, the ability to understand others and the ability to judge interaction situations, and the ability to organize one's own thinking. By acquiring information through language, children's learning gradually surpasses the direct perception of the individual.

Children's language ability is developed in the process of communication and use. A free and relaxed language communication environment should be created for children, encourage and support children to communicate with adults and peers, so that children want to speak, dare to speak, like to speak, and receive positive responses. It is necessary to provide children with abundant and suitable reading materials for young children, and often read books and tell stories with them, enrich their language expression skills, cultivate reading interest and good reading habits, and further expand their learning experience. Children's language learning needs the support of corresponding social experience, and a variety of activities should be used to expand children's life experience, enrich language capacity, and enhance understanding and expression skills. Children should be guided to naturally develop an interest in literature in life situations and reading activities, and children should not be forced to use mechanical memory and intensive training to make children literate prematurely, because this is not in line with children's learning characteristics and receptive ability.

## 3.2.1 Listen and express

**-Let children learn to listen carefully and understand common languages**

Provide more opportunities for children to listen and talk, such as:

often discuss topics of interest with the child, or read books and tell stories together. Guide children to learn to listen carefully, such as: parents should lead by example, patiently listen to the children's speech, and wait for the children to express their opinions after speaking; when talking with children, they should express themselves in a way that children can understand; when talking to children, ask them to speak, listen carefully and encourage him to take the initiative to ask questions. When speaking to children, pay attention to the use of rich language in combination with the situation to facilitate children's understanding. For example: pay attention to the tone and intonation when speaking, so that children can feel the effect of tone and intonation. For example, when telling a story, try to express the happy and sad moods of the characters in the story in different tones and intonation; use some consciously according to the children's level of understanding sentences that reflect the relationships of cause and effect, assumptions, conditions, etc.

### -Encourage children to be willing to speak and be able to express clearly

Create opportunities for children to speak and experience the fun of language communication. For example, parents can set aside some time every day to talk with children, discuss topics that interest him, ask and listen to children's views and opinions on things, etc.; respect and accept The way children speak, regardless of their level of expression, must listen patiently and give a positive response; encourage and support children to play and talk with their peers, and tell each other about their experiences, interesting stories, books, cartoons, etc.
Guide children to express clearly. When talking to children, the adult's own description should be clear and concise; when the child is eager to express and cannot speak clearly, remind him not to worry, speak slowly, and at the same time listen patiently and give the child what

is necessary to help him clarify his thoughts and clearly say what he wants to say.

**-Let children develop civilized language habits**

At this point, parents must first pay attention to language civilization in their lives, set an example for children, and then help children develop good language civilization habits, For example, remind children of necessary communication and understanding based on the situation, be polite to the elders, greet guests when they come, and say thank you for help, etc.; remind children to pay attention to the way they speak with their peers, take turns to speak when with children, and do not interrupt other people's speech, etc.; remind children to pay attention to civilized language in public places and not make loud noises, etc.

## 3.2.2 Reading and Writing

**-Let children like to listen to stories and read books**

Provide children with a good reading environment and conditions, such as providing children with age-specific books, and providing children with a relatively quiet place for independent reading. By accompany children to read books and tell stories, provide literary works of different subjects for children to choose independently, etc. to stimulate children's interest in reading, and cultivate children's reading habits.
Guide children to understand the importance and use of words. For example, in life, when buying a new toy, read the words in the instruction manual to the children, and learn how to play the toy.

**-Let children learn basic reading comprehension skills**

When reading with children, encourage them to express their understanding, for example, guide the children to carefully observe the illustrations, discuss the content of the story in combination with the illustrations; recall the plot in the story with the children, and guide the children to tell the general content of the story in an orderly manner; when telling a story to children, do not tell the name of the story first, let the children name the story according to their own understanding after listening to the story, etc. In reading, children's imagination and creativity should also be developed. For example, children should be encouraged to imagine the development of story plots based on the content of illustrations, and the story should be changed; encourage children to adapt stories

Regarding the training of children's language skills, many intelligent companion robots with different intelligence levels have appeared on the market. Most of them can directly talk to children, or tell children stories, and some can even teach children some vocabulary and calculation skills. For example, Huawei Huohuotu smart early education machine, which is equipped with an intelligent voice system, has massive cloud big data content, can interact with children fun, exercise children's language skills, children can order nursery rhymes and fairy tales, and can also ask Huohuo the various problems that the rabbit wants to understand, help children's development in

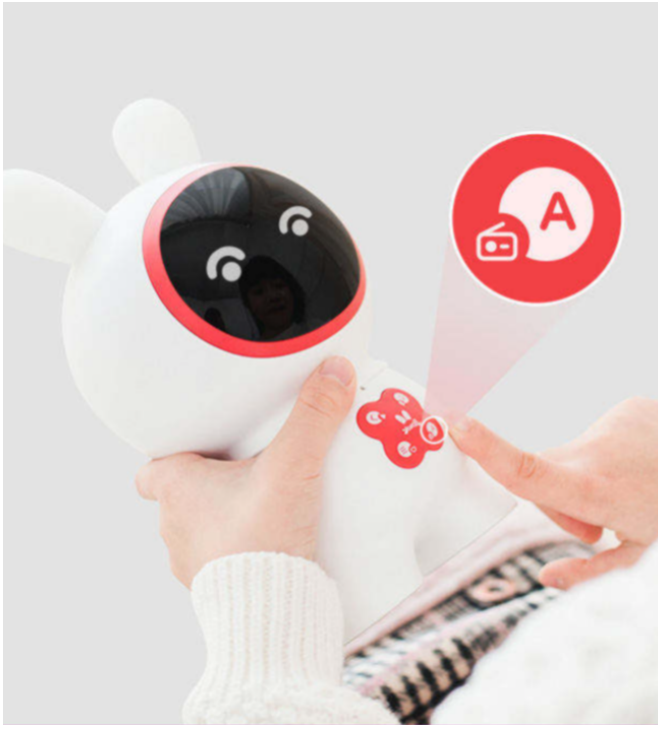



*Fig.23: Huawei Huohuotu, image source: JD.com*

language, social, science, and art. Huohuotu AI intelligent robot has a built-in cloud knowledge base, knows astronomy and geography. It covers the fields of history, geography, humanities, nature, sports, art, people, etc., professionally answering the “100,000 whys” on the way children grow up, and can be satisfied the curiosity of the child at all times . Parents who are busy at work can also chat with their children through Huohuotu during work breaks, so as to keep abreast of their children's situation and alleviate parents' worries about their children at work.

## 3.3 Society

The learning and development process of children in the social field is a process in which their sociality is constantly improved and the foundation of a sound personality is laid. Interpersonal communication and social adaptation are the main content of children's social learning and the basic way of their social development. In the process of interacting with adults and peers, children not only learn how to get along with others, but also learn how to treat themselves and others, and constantly fight against their ability to adapt to social life. Good social development has an important impact on children's physical and mental health and other aspects of development.

Families, kindergartens and society should work togetherto create a warm, caring and equal family and collective living atmosphere for children, establish good parent-child relationships, teacher-student relationships, and peer relationships, so that children can enjoy active and healthy interpersonal relationships. Gain a sense of security and trust, develop self-confidence and self-esteem, learn to abide by the rules in a good social environment and cultural influence, and form a basic sense of identity and belonging.

Children's sociality is mainly developed in daily life and games through

observation and imitation. Adults should pay attention to the role model of their own words and deeds, and avoid simple and blunt preaching.

## 3.3.1 Interpersonal communication

### -Encourage children to be willing to interact with others

Parents should be close to and caring about children, and often play games and activities with children, so that children can feel the joy of interacting with adults, and establish close parent-child relationships and teacher-student relationships.

Create opportunities for communication and let children experience the fun of communication. For example, use the time when relatives and friends' homes or guests come to encourage children to contact and talk with others; encourage children to participate in children's games and invite children to play at homefeel the fun to play with children; at the same time, kindergartens should provide more opportunities for children to interact and play freely, and encourage children to choose freely to partner with each other to carry out activities.

### -Children should be able to get along with their peers

Combining specific situations to guide children to learn the basic rules and skills of communication. For example, when a child does not know how to join a companion game or makes a request that is not accepted, suggest that he take out toys to invite everyone to play together; when the child has conflicts with his companions, guide him to try to solve the problem through negotiation, exchange of toys, etc. at the same time, kindergartens should provide children with more activities that require everyone's concerted efforts to complete, so that children can realize the importance of cooperation in specific activities

and learn about the division of labor and cooperation.
Combining specific situations, guide children to empathize and learn to understand others. For example, when children have unfriendly behaviors such as fighting for toys, guide them to think, "If you are that kid, how do you feel?" Let children learn to understand others thoughts and feelings. Talk to the child about his friend'sand reasons for liking this friend, and guide him to discover the strengths of his peers.

### -Children need to have a sense of self-esteem, self-confidence and autonomy

Parents need to pay attention to children's feelings and protect their self-esteem and self-confidence. For example, parents need to treat children with an equal attitude so that children can truly feel respected; give specific and targeted affirmation and praise to children's good behaviors, so that they can understand and feel satisfied with their own strengths; don't compare the child's shortcomings with the advantages of other children.
Encourage children to make independent decisions and do things independently, such as matters related to children, solicit their opinions, even if their opinions are different from those of adults, parents must listen carefully and accept their reasonable requests; Support children to do things according to their own ideas while ensuring safety; try to let the child do his own things as much as possible, let him do it himself, even if he is not doing well enough, he should be encouraged and given some guidance to let him build confidence and sense of accomplishment when doing things.

### -Children should learn to care and respect others

Parents should lead by example and treat their parents and others with respect and care. Then guide the children to respect and care about

the elders and the people around them, and respect the labor and achievements of others. For example, with the help of story books, etc., tell children about their parents' experiences of raising children, so that children can understand and appreciate parental love and maternal love; based on the actual situation, remind children to pay attention to other people's emotions, understand their needs, and give appropriate care and help. Guide children to learn to treat differences with equality, acceptance and respect. For example, understand that everyone has their own different growth environment, different ideas, different hobbies and specialties, and do not judge others casually.

## 3.3.2 Social adaptation

### -Help children like and adapt to group life

Often participate in some group activities with children, so that children can experience the fun of group activities, such as participating in gatherings between relatives, friends and colleagues, and social activities suitable for children to participate in, etc.; support children and different groups of peers to play together to enrich their lives experience of group activities.

### -Educate children to follow basic codes of conduct

Adults must abide by social codes of conduct and set a good example for children. For example, they must respect the elderly, love the young, and save water and electricity in the public environment. Combining with the reality of social life, help children understand the basic norms of behavior or other rules, appreciate the importance of the rules, and learn to consciously abide by the rules. For example, often play games with children with rules, observe the common rules of the game, use real life scenarios and stories introduces some necessary social behavior rules to children and why they should be

followed; realize the importance of the rules, learn to consciously abide by the rules, for example, often play games with rules and observe the mutually agreed rules of the game, use actual life scenarios and book stories to introduce children to some necessary social behavior rules and why they should be followed rule. Combining the actual situation, let the children experience the inconvenience of no rules, at the same time, children's behaviors of observing the rules must be affirmed and the violations must be corrected.

### -Help children form an initial sense of belonging

Fig.24

Treat children kindly and care about them so that they can feel that their elders are amiable, respectable and trustworthy. For example, play games with children more often and try to create a warm atmosphere in the family and class. Attract and encourage children to participate in collective activities and germinate collective

*Fig.24 : Kids playing with toys , image source: Pexels.com*

consciousness. For important matters and plans for the kindergarten and class, children are invited to collectively discuss and decide; the kindergarten should often organize various forms of collective activities to germinate children's sense of collective honor. Use the way that children can understand to stimulate children's feelings of loving their hometown and motherland.

In addition to public children's entertainment facilities such as slides and swings in the park, there are also toys for multiple people to play on the market, such as some chess and card games or battle games, which support multi-person play and providing children with scenes to communicate with other people will help children improve their interpersonal skills and social adaptability.

## 3.4 Science

Children's science learning is a process of trying to discover the similarities and differences and connections between things in the process of exploring specific things and solving practical problems. In the process of exploring natural things and using mathematics to solve real life problems, children not only gain rich perceptual experience, fully develop image thinking, but also make preliminary

attempts to classify, sort, judge, and reason, and gradually develop logical thinking skillsfoundation for in-depth learning in other fields.

The core of children's science learning is to stimulate interest in inquiry, experience the process of inquiry, and develop preliminary inquiry skills. To be good at discovering and protecting young children's curiosity, make full use of natural and practical life opportunities, and guide young children to learn to discover, analyze and solve problems through observation, comparison, manipulation, and experimentation; help young children continue to accumulate experience and apply them to new learning activities to form lifelong learning attitudes and abilities.

The thinking characteristics of young children are mainly based on concrete thinking in images, and attention should be paid to guiding young children to learn scientifically through direct perception, personal experience, and practical operation. Children should not be instilled and intensively trained in the pursuit of knowledge and skills.

## 3.4.1 Scientific inquiry

In terms of scientific inquiry, children actually begin to have questions and interest in various things when they reach a certain age. Generally speaking, children aged 3 to 4 like to be in contact with nature and are interested in many foods and phenomena around them; they often ask various questions or manipulate objects curiously. Children aged 4 to 5 will like to be exposed to new things and often ask some questions related to new things; they often explore various objects and materials and enjoy them. Children aged 5 to 6 are always inquiring about things they are interested in; they can find answers to questions by themselves; they are always excited and satisfied when they find something in their exploration.

Fig.25

**-Parents need to guide their children to get close to nature and like to explore**

Often bring children in contact with nature to stimulate their curiosity and desire to explore. For example, provide children with some interesting exploration tools, use parents‘ own curiosity and enthusiasm to infect and drive children; discover and share new and interesting things or phenomena around with children, and find answers to questions together; keep and accumulate interesting explorations and discoveries by taking photos and drawing pictures.

Parents should sincerely accept, support and encourage children’s exploratory behaviors in many ways. For example, take children’s problems seriously, guide them to guess and think, and do some simple investigations or interesting experiments with children when possible; tolerate children’s behaviors of soiling, messing up and even destroying objects due to exploration, and guide

*Fig.25 : Child is exploring nature , image source: Pexels.com*

them to tidy up after activities; choose some toy materials or waste materials that can be manipulated, changed, and multi-functional, in order to ensure safety under the premise, encourage children to disassemble or make their own toys.

**-Children must have preliminary exploration skills**

In order to achieve this goal, parents must consciously guide children to observe the surroundings, learn the basic methods of observation, and cultivate observation and classification skills, such as: supporting children's spontaneous observation activities and admiring their findings; guiding children to think through questions, etc. Compare and observe things continuously; guide children to try simple classification and generalization based on observation and exploration, for example, classify animals according to the way of movement, classify plants according to the growth environment, and classify objects according to external characteristics.

At the same time, parents should support and encourage children to actively use their hands and brains to find answers or solve problems in the process of inquiry, for example, encourage children to ask questions worthy of continuing investigation based on observations or findings, or adults to ask questions that are meaningful and can stimulate children's interest; support and encourage young children to boldly associate and guess the answers to questions, and try to verify them, such as: when playing with a windmill, encourage young children to guess the reasons and conditions of the windmill's rotation direction and speed, and actual verification; support and guide children to learn to use appropriate methods explore and solve problems, or collect evidence for your own ideas. For example, if you want to know how many kinds of plants there are in the yard, you can conduct a field survey; if you want to know whether the ball rolls fast on flat ground or on a slope, you can give it a try. Parents should also help children

review the process of their own exploration, discuss what they did and how they did it, whether the results are consistent with the planned goals, analyze the reasons and what to do next.

### -Children will get to know the things and phenomena around them in the exploration

Children will accumulate beneficial direct experience and perceptual knowledge in contact with nature, life things and phenomena, so parents should spend more time with their children through outdoor activities, visits, planting and raising activities, to perceive the diversity and uniqueness of biodiversity, and the process of growth, development, reproduction and death; provide children with abundant materials and suitable tools to support them in exploring and perceiving common substances, material characteristics and structural characteristics of objects during the game.

Parents need to guide children to think in the inquiry, try simple reasoning and analysis, and find obvious connections between things, such as: guide children over 5 years old to pay attention to and think about the significance of the external characteristics, habits and living environment of animals and plants to the survival of animals and plants, such as: the long ears of rabbits have a self-protective effect, and the shape of plant seeds helps its spread; guide young children to speculate and confirm their uses based on common substances, characteristics of materials and structural characteristics of objects, such as: objects with wheels are easy to move, and vehicles for different purposes have different structures.

Guide children to pay attention to and understand the close relationship between nature, technology products and people's lives, and gradually learn to love, respect, and protect nature, such as: combining children's life needs to help them understand the dependence of people on nature, animals and plants; the relationship

between flora and fauna, seasonal changes and people's lives, the impact of common severe weather on people's production and life, etc.; discuss the uses and drawbacks of common technology products with young children, such as the convenience brought by vehicles such as cars to life and pollution to the environment.

For the cultivation of scientific inquiry ability, the most important thing is to cultivate children's inquiry ability and think in inquiry. In fact, if parents are good at using common things to guide children, then the things around us in daily life are enough to cultivate children's inquiry ability. However, there are still some toys on the market that can be used as a supplement to cultivate children's inquiry ability, such as various children's experimental kits. The "Bubble Science Experiment Super Lab" set developed by the Science Can team can cultivate children's scientific cognition, learning interest, logical thinking and exploration ability, use a complete set of more operable experimental instruments and devices suitable for children to build a children's home

*Fig.26: The boy is using "Bubble Science Experiment Super Lab" for experiments, image source: JD.com*

laboratory. The set contains 20 main experiments and 80 extended experiments, covering various scientific principles such as pressure, density, and optics. It records the results of each experiment and stimulates children's interest in learning and science, allowing children to learn and play while training. Guide the child's scientific and logical thinking enhances the child's ability to explore and solve problems.

## 3.4.2 Mathematical Cognition

Regarding mathematical cognition, it is not only the cognition of numbers, but also the cognition of concepts such as quantity, structure, change, space, and information. Children aged 3 to 6 may not know what math is, but they are already exposed to mathematics directly or indirectly.

Generally speaking, children aged 3 to 4 can perceive and discover the shapes of surrounding objects are diverse and are interested in different shapes; they can experience and discover that mathematics can be used in many places in life, even if they may not be able to describe and express clearly. Under the guidance of parents or teachers, children aged 4 to 5 can perceive and experience some things that can be described by shapes, and some things can be described by numbers. They are interested in further exploring the meaning of various numbers in the environment. Children from 5 to 6 years old can already discover the simple arrangement rules of some things and try to create new arrangements; they can discover that many problems in life can be solved by mathematical methods and experience the joy of solving problems.

**-Children need to be able to initially perceive the usefulness and fun of mathematics in life**

Parents should guide children to pay attention to the shape characteristics of things, try to describe things with words that express

shapes, and experience the vividness and interest of the description.

Guide children to perceive and experience that numbers are used in many places in their lives, pay attention to the information of numbers that are closely related to their lives, and realize that numbers can represent different meanings, such as: inding things that use numbers as signs in life with children, such as telephone numbers, clocks, calendars, and commodity price tags, etc.; to guide children to understand and feel that numbers are used in different places, and their meanings are different. The number indicates the time of day and night; encourage young children to try to use the information of the number to make some simple inferences, such as: knowing that today is Friday, can infer that tomorrow is Saturday, and mom and dad will rest.

Guide children to observe and discover things that are arranged in a certain order, appreciate the characteristics and rules of the arrangement, and try to create new arrangement rules by themselves, such as: discover and experience the formations arranged in a certain order with children, and provide music, nursery rhymes and stories with repetitive melody and words, or use the orderly arrangement of patterns in the environment (such as tiles arranged in intervals of colors, bead curtains arranged in intervals of shapes, etc.) to encourage children to discover and feel the laws; encourage children try to design regular lace patterns by themselves, create certain regular movements, or carry out construction activities according to certain rules; guide children to realize that many things in life have a certain order and regularity, such as the order of seven days a week, the order of the four seasons one year, etc.

Encourage and support children to discover and try to solve problems that require mathematics in their daily lives, and to appreciate the usefulness of mathematics, such as: when children bounce a ball, skip rope, long jump, or throw sandbagsthey can count and measure to determine the ranking.

Fig.27

**-Help children perceive and understand the relationship between number and quantity**

Let children perceive and understand the characteristics of the "quantity" of things, for example, perceive the size, amount, height, thickness and other characteristics of common things, learn to use corresponding vocabulary to describe these characteristics; combine specific things to let children gradually through multiple comparisons understanding "quantity" is relative, such as: Mario is taller than Marco, but shorter than Matteo; when packing things, encourage children to sort them according to the characteristics of the quantity of objects, etc.

Combining daily life, instruct children to learn how to compare the amount of objects by corresponding or counting methods, such as: Use the same water cup to hold two glasses of water, let the child compare

*Fig.27 : Three little girls are skipping rope , image source: Pexels.com*

the amount of water; give the child some apples and some oranges, let the child go Count them and compare which fruits are more and which are less.

Use the actual situation in life and games to guide children to understand the concept of number. For example, let children realize that the number of objects will not change due to the different arrangement forms and spatial positions, encourage children to place a certain number of buttons in different forms, and realize that the number of buttons is constant; Combining daily life, provide children with the opportunity to "take objects by number"when playing games, ask the children to take out a few balls as required.

Guide children to understand the relationship between numbers and numbers through physical operations, and use "addition" or "subtraction" to solve problems, such as: Encourage children to try to solve math problems in life by themselves: 5 guests come at home and they are only 3 cups on table, and a few more cups are needed; when purchasing a few items, children are consciously encouraged to participate in the calculation and payment process.

**-Children must learn to perceive the relationship between shape and space**

Be able to pay attention to the obvious shape features of objects, and be able to describe them in their own language, and at the same time can draw or assemble the shape of the objects; can use the direction words such as front and back, up and down, left and right, inside and outside. Parents can use a variety of methods to help children establish connections between objects and geometric shapes, such as guiding children to feel the shape features of various objects in life, and try to identify and describe them; encourage and support children to use building blocks, paper boxes, jigsaw puzzles and other materials in various shapes for construction games or production activities;

when tidying up the building blocks, guide children to experience the conversion between graphics: two triangles can be combined into a square, and two squares can be combined into a rectangle; guide children to observe the graphic features of daily objects and encourage them to sort the objects according to their shapes.

Enrich children's experience in spatial orientation recognition, and let children learn to use spatial orientation experience to solve problems: ask children to use orientation words that they can understand when picking and placing objects, for example, put things under the table on the window sill, and place flower pots Wait next to the big tree; identify the location of familiar places with children, such as: home is next to the post office, the post office is in front of the kindergarten; in sports, music and dance activities, help children feel the spatial orientation and movement direction; play with children in the game of command to find treasure, young children are required to search according to verbal instructions, and older children can be searched according to simple schematic diagrams.

*Fig.28 : Child and some geometric toys , image source: Pexels.com*

# 3.5 Art

Fig.29

Art is an important form for human beings to feel beauty, express beauty, and create beauty. It is also a unique way to express their understanding and emotional attitudes to the world around them.

Every child has a seed of beauty in his heart. The key to learning in the field of children's art is to fully create conditions and opportunities to stimulate children's feelings and experience of beauty in nature and social and cultural life, enrich their imagination and creativity, and guide children to learn to feel and discover beauty with their hearts. Children's feelings and understanding of things are different from adults, and the way they express their knowledge and emotions is also different from adults. Children's unique brushstrokes, movements and language often contain rich imagination and emotions. Adults should fully understand and respect children's artistic expressions and works of art. They cannot judge children by their own aesthetic standards,

*Fig.29 : Two children are making art , image source: Pexels.com*

let alone pursue results. The "perfect" of children is trained in the same way, so as not to stifle children's imagination and creativity.

## 3.5.1 Feel and appreciate

**-Encourage children to discover the beautiful things in nature and life**

Feel, discover and appreciate the beautiful things in the natural environment and human landscape with young children. For example: let children get in touch with nature, feel and appreciate beautiful scenery and good sounds; often take them to visit gardens, historical sites and other cultural landscapes, tell relevant historical stories and legends, and discuss and exchange their feelings of beauty with children.

Discover the characteristics of beautiful things with young children,

*Fig.30 : A group of children are admiring works of art , image source: Pexels.com*

feel and appreciate beauty. For example: let young children observe common animals, plants and other objects, and guide young children to describe their beauty in their own language, actions, etc., such as color, shape, etc.; allow young children to listen and distinguish various sounds, and guide young children to use their own methods to express his feelings about timbre, strength, and speed; support young children to collect favorite items and enjoy them with him.

**-Like to appreciate a variety of art forms and works**

Create conditions for children to be exposed to a variety of art forms and works. Frequently expose children to appropriate music in various forms to enrich children's feelings and experience of music; decorate and beautify the environment with pictures and handmade products together with children; if possible, take children to theaters and art galleries, Museums, etc. to appreciate cultural performances and works of art.

Respect children's interests and unique feelings, understand their behaviors when they appreciate, understand and respect children's behaviors such as dancing, improvisation and imitation when they appreciate art works; when children take the initiative to introduce their favorite dances, operas, paintings or crafts, be patient to listen and give positive response and encouragement.

## 3.5.2 Performance and Creation

**-Like to engage in artistic activities and express boldly**

Create opportunities and conditions to support children's spontaneous artistic performance and creation. Provide a wealth of materials, tools or objects that are easy for children to pick and place, encourage children to engage in independent painting, handicraft, singing,

performance and other artistic activities; often sing, perform, draw, and make with children, and share the fun of artistic activities.

Create a safe psychological atmosphere so that children are daring and willing to express themselves. Appreciate and respond to children's spontaneous artistic activities such as humming and singing, imitating performances, and admire his unique way of expression; in the process of children's independent expression and creation, parents should not interfere too much or impose their wishes on children. Give specific help whenever possible; understand and listen to the thoughts or feelings of children's artistic expressions, understand and respect children's creative intentions, and not simply use adult standards such as "like or not" and "good or bad" to evaluate; show children's works, encourage children to decorate the environment with their own works or artwork.

### -Have preliminary artistic expression and creative ability

Respect children's spontaneous performance and creativity, and give appropriate guidance. Encourage children to observe and experience carefully in life, and accumulate experience and materials for artistic activities. For example, observe the shape and color of different tree species. Provide a wealth of materials, such as books, photos, paintings, or musical works, so that children can choose independently and imitate or create in their own way. Adults don't make too many demands. According to the children's life experience, jointly determine the theme of artistic expression with the children, and guide the children to imagine and perform artistic expressions around the theme. When children draw, it is not advisable to provide model paintings, and in particular, children should not be required to imitate completely according to the model paintings. Affirm the advantages of children's works and guide them to improve by expressing their feelings.

Fig.31

Fig.32

Children can use the paper and fabrics they already have at home for artistic creation, there are also many toys on the market that are similar to handmade paper, cloth art DIY suits, and plasticine suits that can be used for children's artistic creations.

*Fig.31 : Two kids playing with plasticine , image source: Pexels.com*
*Fig.31 : A child is practicing embroidery , image source: Pexels.com*

## 3.6 Summary of children's characteristics and needs

Children of different ages have different cognitive styles and ability characteristics, so they will also have different needs and preferences for children's products.
The following content combines the analysis of Chapter 3 and interviews with 15 kindergarten teachers and 12 parents to summarize the differences in characteristics, abilities, and preferences of children at different ages.

Children from 3 to 4 years old focus on concrete cognition and generate memories through sensory stimulation.
In terms of ability, this stage is a period of children's language explosion, but they cannot express themselves freely. They can use simple language to explain their art works, have 10-15 minutes of concentration, have strong imitation ability, self-awareness and curiosity, and prefer to study nature.
They like more hands-on activities and low-structure game materials. Mainly play alone, with incidental observation of others. They like familiar daily objects and feel more secure. Due to the development of the brain, children's nervous system is becoming more and more perfect, and the control of muscles and various parts of the body are becoming more and more refined. At this time, the children's balance ability, hand-eye coordination ability, fine motor ability of the hand and the ability to control the body movement will be greatly enhanced, so we will see young children start to graffiti with their fingers.

Children between 4 and 5 years old use a combination of concrete cognition and abstract cognition to form a corresponding relationship between objects and pictures.
This period is an aesthetically sensitive period, and children

began to be assertive about their clothes, and based on their own understanding, they began to rebuild the surrounding environment. It was also a sensitive period in society, and they started to make friends, share, and look for like-minded people. At the beginning, they can complete figurative works of art, such as drawing an apple, etc. Children's cognitive abilities are gradually enhanced. At this stage, children's various sensorimotor behavior patterns begin to internalize and become representational or image thinking, especially due to the appearance and development of language, prompting children to use representational symbols to replace or reproduce external things more and more frequently, and representational thinking appears. The attractiveness of simple electronic products has begun to decay, and complex electronic products such as IPAD can be understood at the same time. At the same time, the demand for communication and dialogue has increased.

In terms of preference, girls began to like cooperative games such as play house and aesthetic toys, while boys began to like competitive games and toys with a sense of power. Begin to like electronic products.

Children aged 5-6 can realize the correspondence between the concrete cognition and the symbols, and the concrete manifestation is that they can correspond to the real object and the text.

Children develop logical expression skills at this stage. Have the ability to create more concrete works of art, and have a story, eager to share their own stories. There will be fantasy based on reality. At this time, children spend most of their time in imagination and like to play some imaginative games. They can do 25-30 minutes of concentration.

Their memory ability, coordination ability and competition consciousness are obviously enhanced. A sense of regularity gradually formed.

In terms of preferences, boys like volcanoes, cars, battleships, aircraft

carriers, etc. Colors prefer blue, green, yellow, and black. Girls like princesses, dolls, costume design, castles, etc. The color is more pink, red, and gorgeous. They start to like content-level things, such as TV shows, and they have a desire to explore technological content.

According to the global concept of early childhood development, children before the age of 3 have relatively weak cognition, children's toys have fewer functions and more simplified forms. Children's electronic products are generally screenless and less interactive, and more of them are simple voice or visual feedback. Parents do not have a high demand for electronic products, and ordinary toys can meet the needs of children. Parents pay more attention to the physical care of children.

The 3 to 6-year-old kindergarten period is a period of rapid development and formation in cognition, language, and psychology. It requires a variety of information and the input of various forms of content. This period has both self-developed learning needs and complex learning needs. Electronic products began to generate interest. In terms of the external environment, there is no academic pressure at this stage. Cultivating children's interest and developing children's quality education has become an important focus of the home school. Parents have begun to look for and pay attention to products that can improve children's abilities and at the same time make up for the lack of parental companionship.

# 4. Conclusion

With the rapid development of technology, the cost of electronic products has gradually decreased, and electronic products have gradually occupied an increasingly important position in people's lives. I have to admit that electronic products have brought more and more convenience to our lives, but at the same time, children's dependence on electronic products has become more and more uncontrollable, and the age of first contact with electronic products has become lower and lower.

Electronic products have both advantages and disadvantages for children's physical and mental health development. The advantage is that if used properly, electronic products can cultivate children's various abilities, give them a certain amount of companionship, etc., far more than ordinary physical products can bring children. But the disadvantages are also obvious. Parents worry that their children will be exposed to some things that affect their physical and mental health through electronic products, such as online violence, online fraud, etc.; they are also worried that long-term use of electronic products will cause children to become dependent and cause damage to their eyesight, etc.

Therefore, since it is impossible to keep children away from electronic products, we can use the existing advantages of electronic products to try to weaken its disadvantages. We can use the combination of electronic products and physical toys to bring children's attention back to reality to a certain extent, avoiding children from being overly addicted to electronic products, while also taking full advantage of

the "multifunctional" advantages of electronic products. At the same time, use the combination of electronic products and physical toys to create more possibilities and solve the problems that parents are more worried about. For example, design some games that must be played outdoors and encourage children to do more outdoor sports; design some multiplayer games to promote The development of children's social skills; set some restrictions on the electronic product to prevent children from contacting bad information, etc.

# Competitive Product Analysis

# 5. Related technologies and products

The technology that can be combined with physical toys is interactive projection technology, so what is interactive projection technology? Interactive projection technology captures and shoots a target image (such as a participant) through a capture device (sensor), and then is analyzed by an image analysis system to generate the motion of the captured object. The motion data is combined with the real-time image interactive system to enable the participant produces a closely integrated interactive effect with the screen.

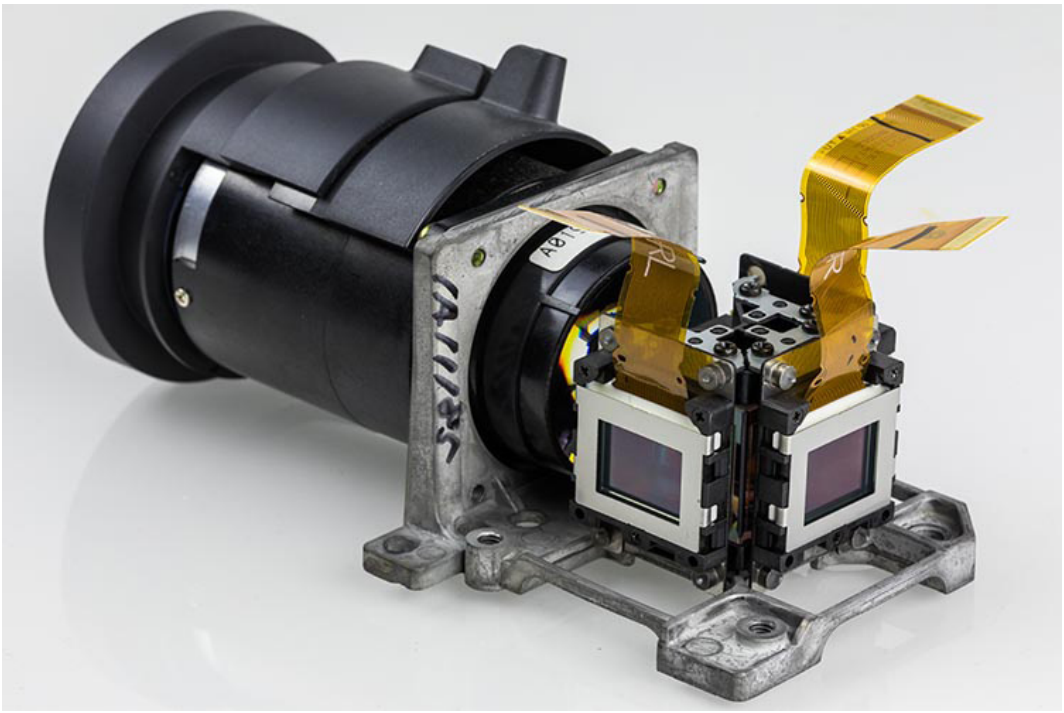


*Fig.33 : Internal structure of ordinary projector , image source: Essential Picks*

The interactive projection equipment is mainly composed of four parts: the first part: the signal acquisition part, which captures and shoots according to the interactive needs. The capture devices include infrared sensors, video cameras, thermal cameras, etc.; the second part: signal processing part, this part Analyze the data collected in real time and connect the generated data with the virtual scene system; the third part: the imaging part, the use of projectors or other imaging equipment to present the image in a specific position, the imaging equipment in addition to the projector, plasma displays, liquid crystal displays, and LED screens can all be used as carriers of interactive images. The fourth part: auxiliary equipment, such as transmission lines, installation components, sound equipment, etc. The most important of these are infrared sensing technology and projection technology, which are briefly introduced in this article.

# 5.1 Infrared sensing technology

In view of the fact that the main use scene of this product is at home and the space in the home is limited, the interactive projection technology used in the home basically only involves infrared recognition and touch technology of the hand.

Infrared multi-touch positioning technology recognizes and describes the two-hand touch interaction actions, and establishes a two-hand touch interaction model. This interaction technology is more natural and intuitive than traditional mouse operations, and greatly improves the efficiency of human-computer interaction.

## 5.1.1 Infrared sensor touch positioning

The infrared light sensor has both the function of transmitting and receiving infrared light. The light sensor integrates an infrared light transmitter and receiver. It uses infrared light-emitting diodes as the

light source, and a charge-coupled device CCD as a light detection device. The retro-reflective belt is a row of special light-reflecting materials distributed on the edge of the display device to reflect the infrared light in the original direction.

During the touch detection process, the infrared light emitted by the infrared light-emitting diode enters the retro-reflective surface and then returns along the original path, and the infrared receiving sensor CCD receives the returned infrared light to form a light band image. When a finger, pen or other pointing object enters the infrared light field occlusion effects will occur at times, and these occlusions cause part of the light to not be reflected normally, so that finger shadows and shapes appear on the CCD's receiving light belt.

Due to the influence of the retroreflective band itself and the external infrared interference, the image obtained on the infrared CCD camera is not a single light band image, but a complex image with many infrared interference backgrounds. The following steps are used to locate and extract the light band:

1. Edge detection: Determine the edge of the light band by extracting the edge features of the light band area.

2. Light band area detection: Scan the image horizontally and vertically, and use a rectangular frame to determine the area of each part of the light band detected.

3. Area merging and filtering: If the areas of the light bands obtained by area detection are adjacent to each other, they will be merged, and the detection areas that do not conform to the law of light band characteristics will be filtered.

According to the results of two adjacent CCD detections, the state of the touch can be judged, and whether the touch point is an entry point, an exit point, or a continuous touch point.

There is a specific algorithm for the recognition and positioning of each touch point. After the light occlusion process is completed, the infrared receiving sensor obtains the occlusion information of the finger, and

then uses the triangulation algorithm to locate the occlusion point to determine the touch position.

### 5.1.2 Two-handed interaction action recognition system

On the basis of light-sensing multi-point positioning, the touch action of both hands can be recognized through the analysis of the change of the position of the touch point, the increase or decrease of the number, and the trajectory of the touch point. The implementation of two-hand movement is a process behavior with a time span, so it requires real-time analysis and processing of the two-hand operation process, and timely notification to the upper layer so that the application system can respond in real time. The two-handed interaction recognition system accomplishes the following functions through a method based on process analysis:

-Hand movement detection

-Both hands touch shape verification

-Touch track recognition

-Multi-action mode classification

Based on real-time hardware detection of multi-point positioning recognition, the general program of two-hand interaction recognition detects the movement characteristics of the hands, judges the touch shape of the hands on the screen, and then estimates the posture of the hands. During the movement, the movement trajectory of the hands is continuously recorded, and the movement model processing recognizes two-hand movements.

Using two-hand touch interaction, users can get rid of the shackles of traditional interaction methods and use natural and intuitive ways to communicate with the information space without barriers, so that more energy can be devoted to task analysis and problem solving. The user's two-handed actions conform to the natural operating habits, it

is easy to establish a consistent mapping between the user's mental model and the interactive actions, and the user-centered design idea is reflected in the interaction process.

## 5.2 Projection technology

In the world of digital projection, there are four main projector technologies: DLP, LCD, LED, and LCOS. DLP stands for Digital Light Processing which employs a chip comprised of microscopic mirrors and a spinning color wheel to generate an image. LCD projectors opt for liquid crystal displays rather than physical moving parts as you'll find in DLP projectors. LED projectors, or light emitting diode projectors, are a bit of a different breed. These are either DLP or LCD technologies, but tout LED light sources. LCoS on the other hand stands for liquid crystal on silicon and is a sort of DLP-LCD hybrid which uses liquid crystal chips and a mirrored backing. Then, there are laser projectors which differ from lamp-based projectors by opting for a solid state laser rather than a lamp for its light source.

*Fig.34 : Projector usage scenarios , image source: Pinterest*

## 5.2.1 DLP projector the benefits of DLP projectors

A DLP, or digital light processing, projector makes use of tiny mirrors which in turn reflect light toward a screen. There's typically a physical color wheel, which is a literal spinning wheel full of color filters used to generate sequential colors. These can be found as single-chip DLP projectors, or three-chip DLP projectors with red, green, and blue DLP chips. Price varies quite a bit, from a couple hundred dollar to ten of thousands. DLP projector are easily the most common, with the vast majority of home theatre projector utilizing DLP technology.

Light output on DLP projectors tends to be robust, and suitable for atmospheres with ambient light such as classrooms and conference rooms. Likewise, color accuracy, while varying quite a bit by device, oftens shines with DLP projectors. Motion blur isn't a huge issue on most DLP projectors, with crisp and sharp images during fast-motion sequences in action flicks and sports. However, DLP projectors may be plagued with rainbow artifacts where bright objects may give off the appearance of a sort of light trail. This doesn't affect three-chip DLP projectors, but single-chip DLP projectors might experience artifacting.

## 5.2.2 LCD Projector and the benefits of LCD projectors

While LCD, or liquid crystal display, technology is common in TVs and computer monitors, it's also popular in the projection space. LCD projectors feature three LCD panels which in turn cast an image using a primary color: red, blue, and green. All three are simultaneously projected so that the resulting image is displayed in its full coloring. Price varies quite a bit, from a few hundred to the upper thousand.

Generally, LCD projectors are pretty inexpensive to operate since they eschew moving parts. Lamp life is generally much higher than with

DLP projectors. Color accuracy is top-notch, and there's pretty low power consumption. Black levels shine, and light output or lumens can be pretty high. Rainbow artifacts are kept to a minimum, though motion blur may be an issue.

## 5.2.3 LED Projector and the benefits of LED projectors

LED is a common term in lighting technology, standing for light-emitting diode. Whereas DLP and LCD projectors refer to projection technology, LED concentrates on light source. In fact, LED projectors may use DLP or LCD technology. But rather than a traditional lamp, LED projectors instead use high efficiency bulbs which substantially increase lamp life. As opposed to the 1,000-5,000 hour lamp life of most projectors, LED projectors instead boast upwards of 20,000 hours. Like LCD and DLP projectors, these can be incredibly inexpensive or bank account-emptying. Black levels, motion blur, color accuracy, and artifacting depends on the underlying projection source, DLP vs LCD. However, maintenance of LED projectors minimizes overhead since there's a filterless design, and long lamp life. My BenQ GV1 and ZTE Spro2 projectors are LED devices, making use of an LED light source and DLP projection technology.

## 5.2.4 LCoS Projector and the benefits of LCoS Projectors

LCoS, or liquid crystal on silicon, arrives as a sort of LCD-DLP fusion. At its core, LCoS employs liquid crystal chips that have a reflective backing similar to DLP. However, an LCoS projector passes light through LCD panels which gets modulated by liquid crystals. Therefore, it's at once a reflective technology and one which opts for LCDs rather than mirrors. There's extremely high resolution, and SVGA

LCoS projectors don't even exist. Yet this comes at a cost: weight. The lightest LCoS projectors clock in a but over 10 pounds. DLP, LCD, and LED projectors are far more portable. The likes of JVC and Sony use proprietary LCoS tech, D-ILA and SXRD respectively. I've got a hulking Sony VPL-VW60 home theatre projector with LCoS technology onboard and, while not nearly as portable as my ZTE Spro2 or BenQ GV1, the VPL-VW60 delivers top-tier image quality with lush color reproduction and gorgeous black levels. Usually, price is a bit higher, mostly in the thousands.

There's a reason videophiles flock to LCoS projectors, and contrast ratio, an important image quality spec, proves why. Performance is superb, and likewise black levels are incredible with deep blacks and bright whites. Light output can vary, with many older LCoS projectors offering pretty low lumens and newer LCoS sets yielding high light output. Unfortunately, motion blur, as with LCD projectors, may be an issue, though there's almost no rainbow artifacting.

# 5.3 Analysis of Related Competitive Products

## 5.3.1 Children's electronic products

The electronic products specially designed for children to play on the market are mostly electronic products with relatively single functions such as children's watches, children's cameras, children's tablet computers and children's escort robots. More complex children's electronic products have programming functionsthey use existing electronic products (such as ipad, mobile phones, etc.) to control, or use cards for splicing, and camera recognition to achieve programming. Only a few products that combine physical toys and electronic devices, such as Osmo and mTiny, have more functions and

can be continuously expanded, these two products are mainly recognized by optical recognition sensors or cameras, interact with children through sound, light and vibration or physical screens, and come with different toy kits to expand the product. It is mainly used to develop children's logical thinking, mathematics and spelling skills.

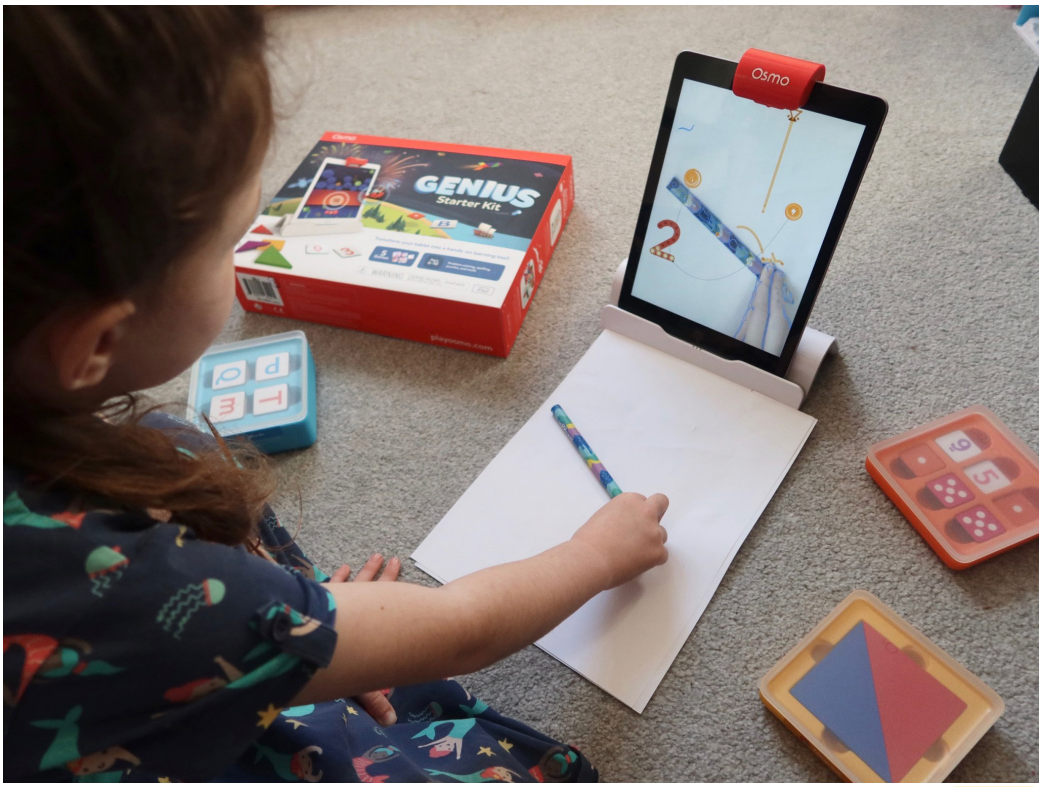



Fig.35

Osmo is an iPad kit designed specifically for children and must be used with the tablet. It includes a reflector that clips onto the tablet's camera and a tablet base, as well as a range of toy kits for users to choose from. Its working principle is to clip the mirror over the camera of the tablet computer. Using the principle of mirror reflection, the camera of the tablet computer can scan the actions of children on the desktop and the state of

*Fig.35 : A scene where children play with Osmo , image source: realmumreview.com*

toys, and realize the interaction with children through the app of Osmo. Children can use Osmo to learn and play with numbers, spelling, puzzles, coding, drawing, and even commercial games, such as running their own pizza place.


Fig.36

mTiny is based on Piaget's theory of child cognitive development. It consists of a reading pen, a small robot, and a range of kits that can be purchased separately. The pen has reading, remote control and motion-sensing functions, while the small robot interacts with children through LED lights, speakers and optical recognition sensors. This product exercises children's logical thinking and problem-solving ability by the way of point-reading control robot interaction. It brings the programming on the screen to the child's real life, and guides the child to explore, perceive and create through highly interactive and interesting games. Continually updated expansion

*Fig.36 : The mobile app interface corresponding to Osmo , image source: realmumreview.com*

packs will also foster child's interest in math, English, music and other subjects, so that children will constantly get new inspiration. It greatly distracts children's attention from electronic products with screens, and at the same time uses the robot's eyes, movements and sounds to interact with children. It also has a very important function, is "multiplayer play", which greatly improves children's social opportunities and social skills.

Fig.37

Fig.38

*Fig.37 : Close-up photos of mTiny products , image source: engadget.com*
*Fig.38 : Two kids are playing mTiny , image source: Amazon*

## 5.3.2 Interactive touch projection technology related products

Fig.39

Intelligent interactive touch projection technology is realized by using two technologies: ultrashort focus projection and touch sensing. The "magic" of touch projector technology is its ability to turn any surface into a touch screen. Touch projectors are provided in separate, dedicated devices, and their sizes vary depending on the resolution and space of the display area. It can display content from any supported compatible software, such as Windows and Android. It can be displayed on any suitable surface such as data display, whiteboard, wall, arm or 16-100 inch projector size interactive table. Users can interact with the multi-touch screen using the touch projector's stylus, a finger or a traditional dry-erase marker. There is a strong demand for this technology because it makes project presentations, classes, and recreation special. It gives many people the convenience of interacting with touch screens simultaneously, sharing ideas, and encouraging collaboration using a complete interactive projection solution that combines the capabilities of a whiteboard and a multi-touch display.

About its use scenes, mainly family, business and outdoor sports. In the family, it can be used for the interaction of family gatherings, the projection on the kitchen countertop to follow the recipe to cook, use the screen when taking a bath without worrying about getting wet,

*Fig.39 : Jarvis AirTouch in "Iron Man" , image source: smzdm.com*

etc. Business scenarios are mainly used for company meeting interaction or multi-person collaboration, etc. The outdoor scene is mainly used for sports watches or wristbands with intelligent interactive projection technology to solve the mobile phone carrying problem of outdoor sports enthusiasts.

One of the most famous products involved in intelligent interactive projection technology is Sony's Xperia Touch projector. The Xperia Touch has three main features: an infrared Touch, body sensing and a portable projector. The Xperia Touch combines an infrared array with a 60fps camera capture to turn any smooth surface in your home into a 23-inch Touch screen. The Xperia Touch opens automatically when it senses someone approaching, can be used as a message board for the front door to keep everyone in touch, or can be set


*Fig.40 : Xperia Touch is operated on , image source: 51touch.com*

up as a wall clock that appears when someone is in the room. The Xperia Touch includes Sony's unique SXRD short-range projector unit and strategically placed dual-frequency stereo speakers that miniaturized the projector and delivered sound quality.

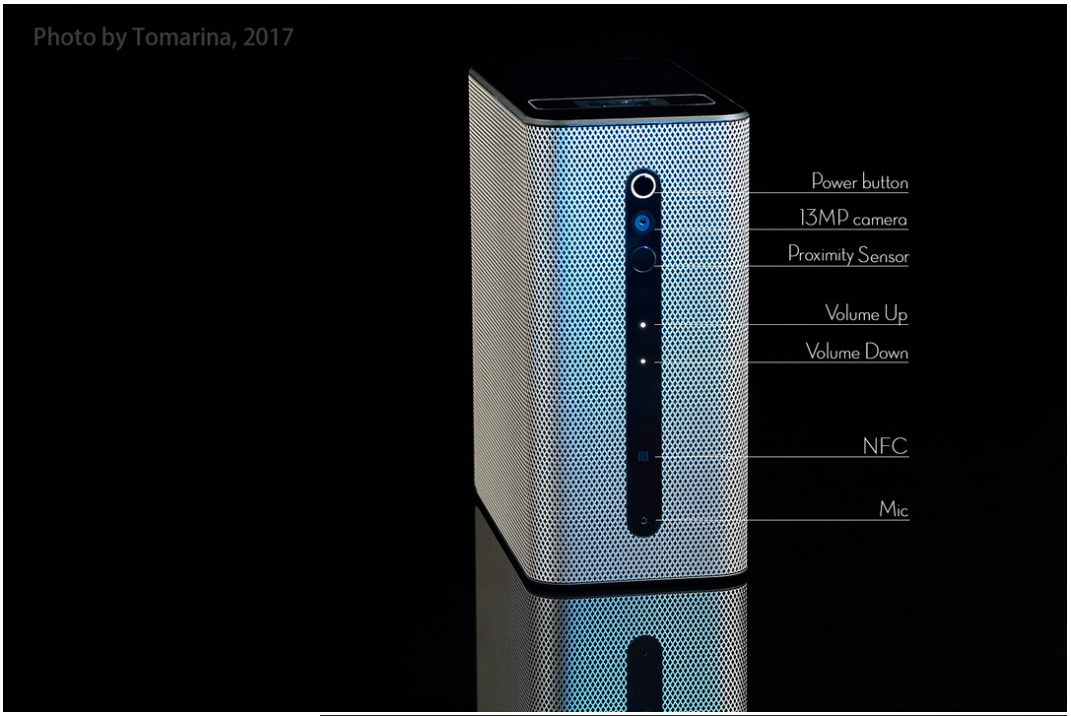



Fig.41


Fig.42

*Fig.41 : Xperia TouchX's buttons and their functions , image source: smzdm.com*
*Fig.42 : The principle of ultra-short projection , image source: smzdm.com*

Intelligent interactive projection technology will also be used in sports wristbands. In a research paper published at CHI 2018, the CMU team from Carnegie Mellon University's Human-Computer Interaction Institute, in collaboration with ASU Tech, revealed the implementation of the first fully functional and projection smartwatch-Lumiwatch. By projecting the display onto the wearer's forearm using a shallow Angle projection, the Lumiwatch's interactive surface area is more than five times that of a typical smartwatch display. The one-dimensional depth-sensing array is able to monitor finger tracks to track input, and its 15-lumen projector output is bright enough to be seen outdoors when the watch is worn. The interface also requires a "swipe to unlock" mechanism to prevent accidental touching of the arm.

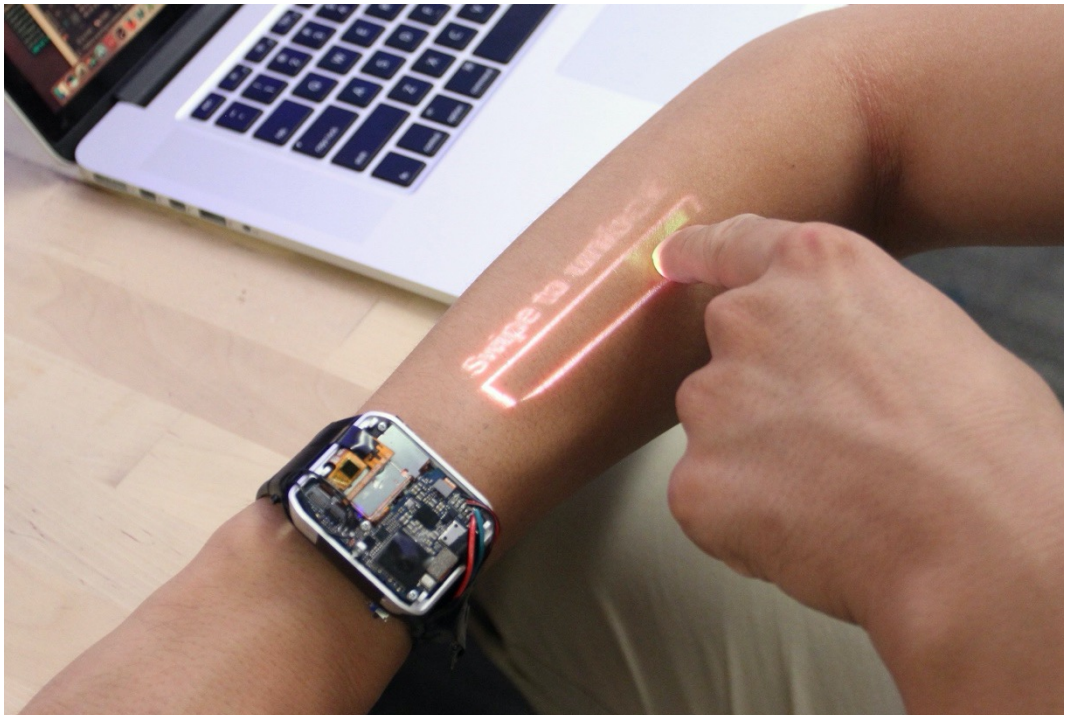



Fig.4

*Fig.43 : Lumiwatch usage scenarios , image source: hcii.cmu.edu*

# Target

# 6. Target

Pull back the child's attention to reality, reduce electronics to their attraction.

As mentioned earlier, with the advancement of the development and science and technology, today, one of the biggest challenges of parents is how to reduce the time that their children spend on electronic devices such as mobile phones, tablets, video games, television and computers and how much time can be reduced. This is not only a bigger child's problemmany children with a small age have also started using mobile phones and they are attracted.

The child staring at the screen and there are many situations, and as the child grows up, the use of high-tech products will usually turn into a constant screen usage timeand the harm of electronic products on children's body and mind is obvious. At the same time, using the screen usually means passive entertainment or absorbing information, it is not conducive to the development of children's imagination and creativity, so parents try to find things that can make children distract or make children calm.

Since the social environment determines that children cannot completely avoid exposure to electronic products, we can use electronic products that have less physiological impacts to children, to interact with children, at the same time, the electronic product must be used with the supporting physical fittings, thereby more attracting the child's attention to the entity toy, guiding children to generate active thinking and exercise.

So the purpose of the design uses intelligent interaction projection technology to combine with the entity toy, attracting children's attention to entity toys. At the same time, intelligent interactive projection technology does not use entity screens, which reduces the impact on child vision to a certain extent.

# Personas

## *Anna*

5 years old

Shanghai, China

Kindergarten student

Father, Mother, Younger brother

Anna is a 5-year-old girl in an international kindergarten in Shanghaiso she has her own English namein fact, her Chinese name is Yicheng Lin. She lives with Mom and Dad and the three-year-old brother. Her Dad is an engineer, mother is a manager of a foreign company. Her Mom and Dad are very busy, so many times the nanny aunt is taking care of her and her brother.

# Bisogni

- Try to reduce the appeal of electronics, stay away from the hazards of the network, help children find more fun in life

- Multi-functional products, there can be multiple gameplay, and even can continuous expansion

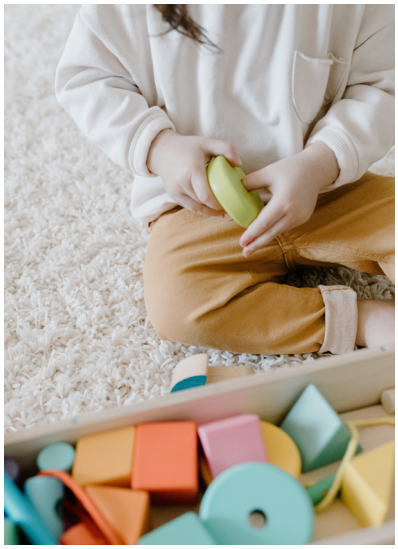
- Can accompany the child to a certain extent, because Mom and Dad are busy working, can't accompany for a long time.

- Can play with brother or other children, enrich social ability

# The project design

# 7. Design Process

## 7.1 Moodboard



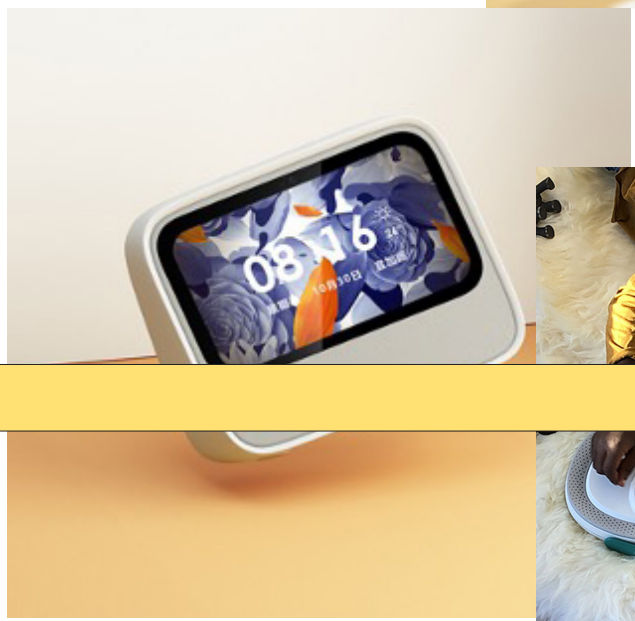


*Image source: Pinterest, Pexels.com*

# 7.2 Concept

After previous research, I found that children's products need to meet the following characteristics: safe, comfortable for children, round and brightly colored, which means that tough shapes, unsafe materials and dull colors need to be avoided.

Based on the previous analysis, I want to design an intelligent interactive projection that can be used on the desktop, and it can also interact with physical accessories to achieve more functions.

Based on these analyses, I drew the following sketch.

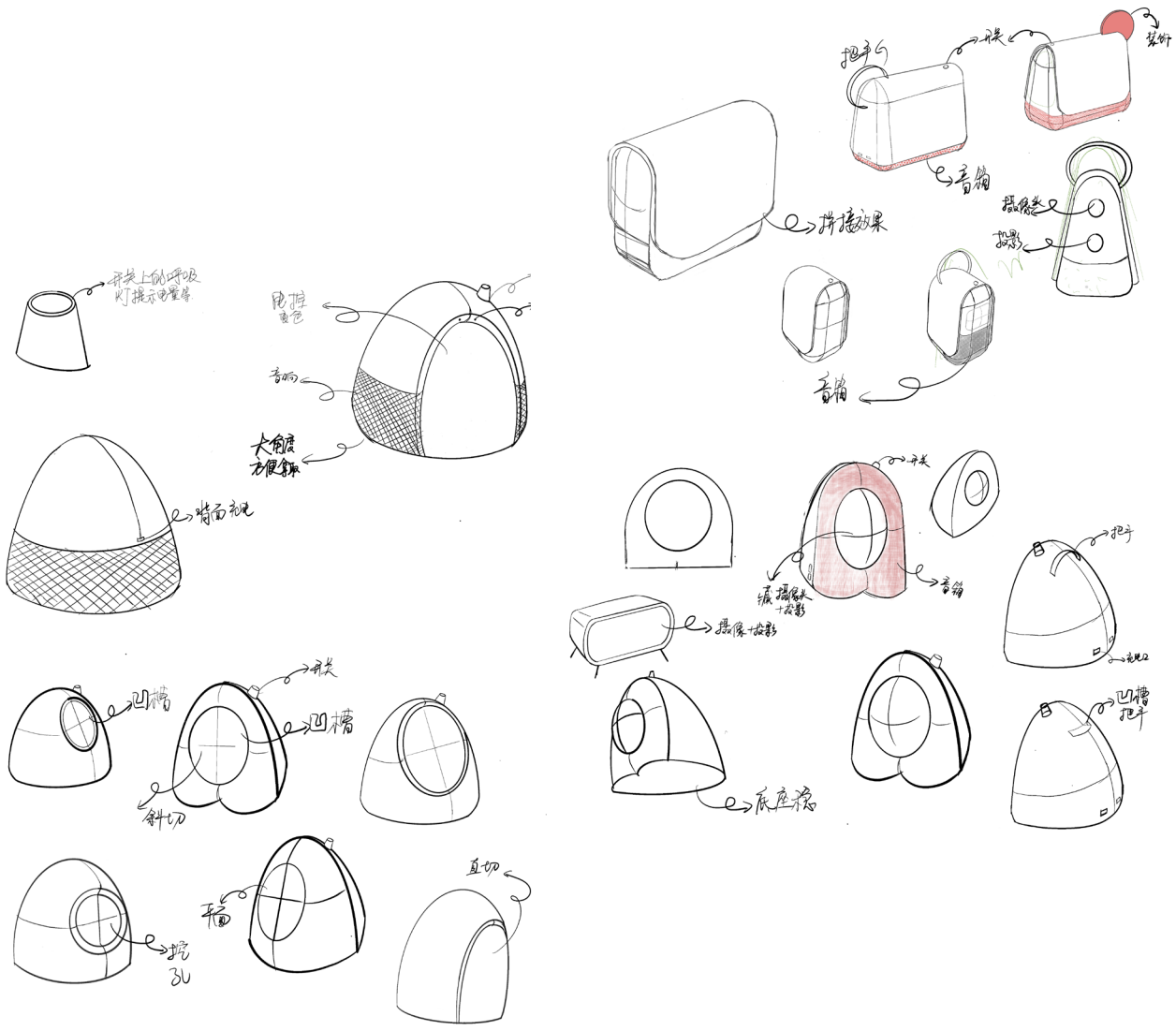



*Fig.44 : Sketch of the product*

# 8. Real-IN

## 8.1 Product description

REAL-IN is a smart projector, and children can interact with the projector using various physical supporting accessories. Support single or multiplayer play and train children's logical thinking and creativity.

The product uses a combination of virtual screens and physical accessories to satisfy children's desire for electronic products, while also helping them to perceive reality.

*Fig.45 : Product rendering*

# 8.2 Product details

From the front of the product, from top to bottom are the switch with breathing light, the microphone and black plastic plate with transparent center and translucent outer ring.

The breathing light on the switch will light up when the children turn on the switch, and it will also light up in different colors when the children complete the game or win the game, creating a certain degree of interaction with the children.

The function of the microphone is mainly used for talking with parents and playing games that require voice.

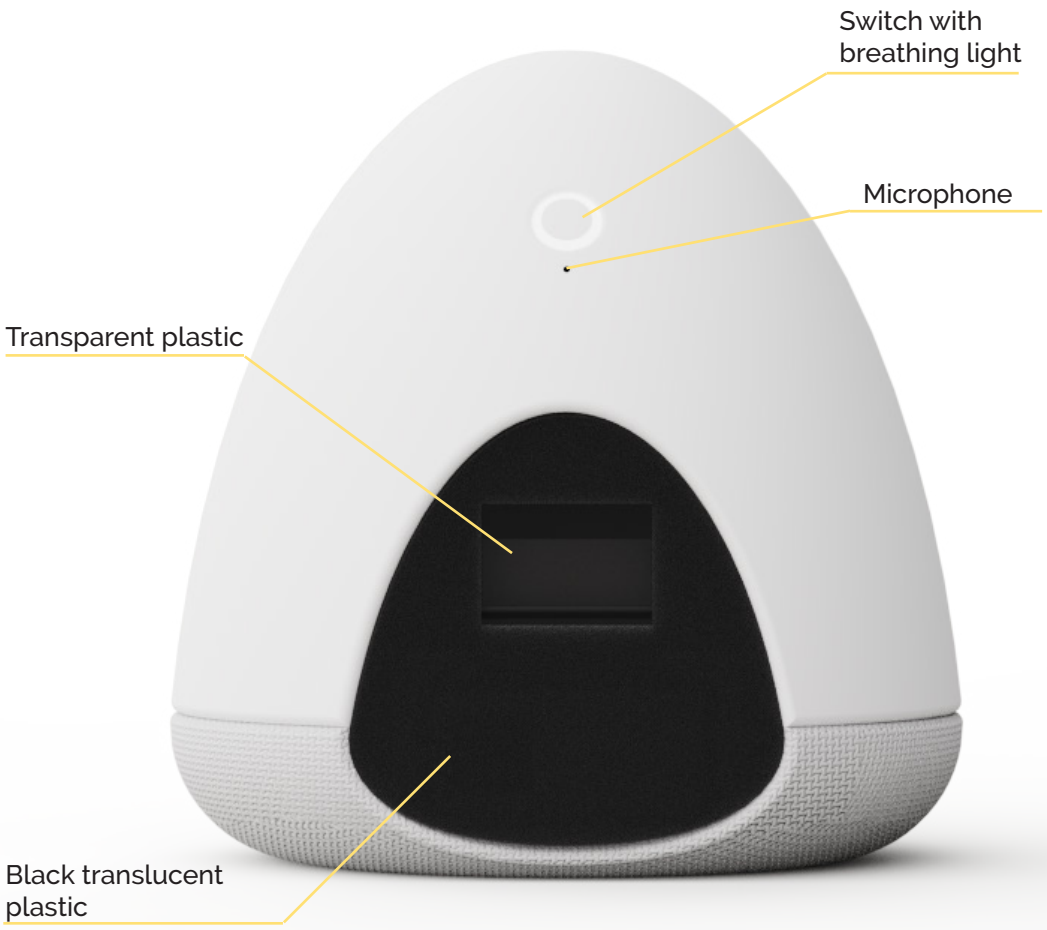



*Fig.46 : Introduction to the function points on the front of the product*

The transparent plastic window is used to project the projection image, and a camera and infrared sensor are hidden inside the black part. The camera is used to monitor the situation of the desktop, for example to determine whether the child has completed the game, or which child has won the battle. The infrared sensor is used to recognize the click action of the hand, so as to realize the operation of the interface.


*Fig.47: Introduction to the function points on the back of the product*

From top to bottom on the back are: volume button, Type-c interface, headphone jack and audio.



Fig.48

There are raised "plus" and "minus" on the volume keys, and you can clearly determine which one is used to increase the volume and which is used to decrease the volume without checking.

Fig.49

The Type-C interface is used to charge Real-IN.

And the headphone jack is to take into account that children can easily use Real-IN to play games when the people around them are resting, without worrying about disturbing others.

The audio supports the sound of the game under normal circumstances.

*Fig.48 : Product volume button details*
*Fig.49 : Product interface details.*

# 8.3 Product internal structure

The internal components of Real-IN mainly include: battery, motherboard, ventilator, camera, projection part, infrared sensor and audio.


*Fig.50 : Product exploded view*

The projection part is mainly composed of illuminator, one-way mirror, imager, lens, reflector.

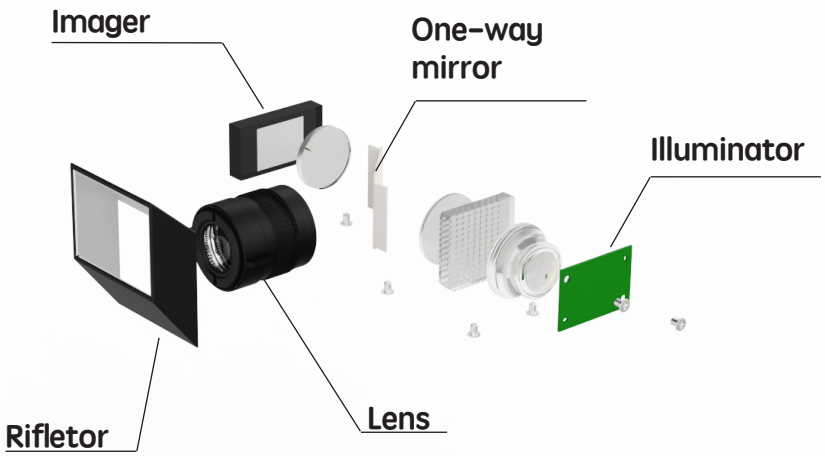



Fig.51

## 8.4 The principle of ultra-short projection

Since ordinary projectors are projected on the wall, and Real-IN needs to be projected on the desktop, compared with ordinary projectors, the projection distance needs to be shortened to project a clear picture. So Real-IN uses a reflector to reflect the light multiple times, that is, when the total path of the light remains unchanged, the projection distance is shortened. The path of the light is as follows:

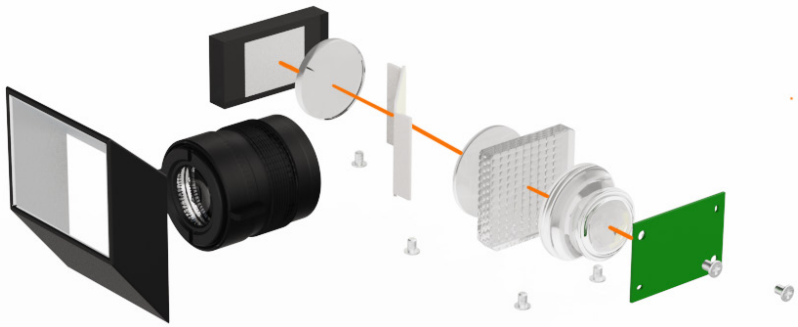


Fig.52

*Fig.51: Exploded view of product projection*
*Fig.52: Light path diagram*

1. The illuminator emits light to the imager to produce an image.

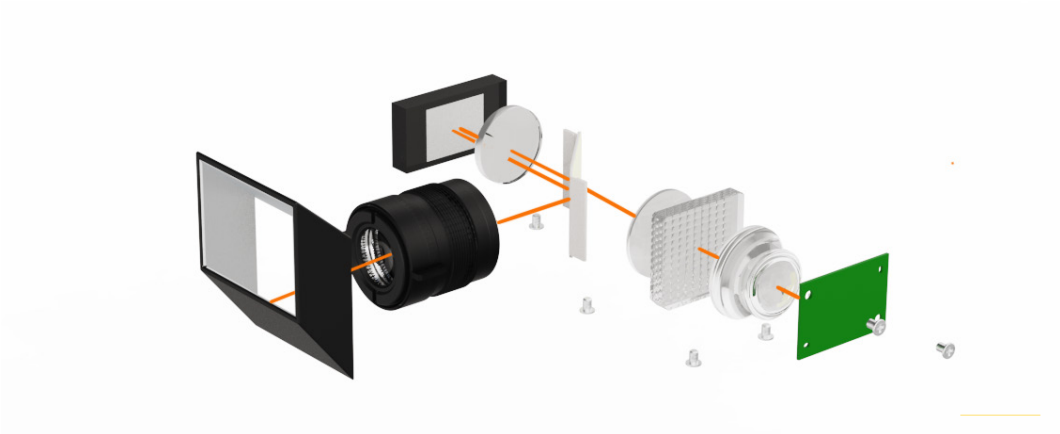


Fig.53

2. The image is reflected by the one-way mirror and reaches the reflector through the lens.

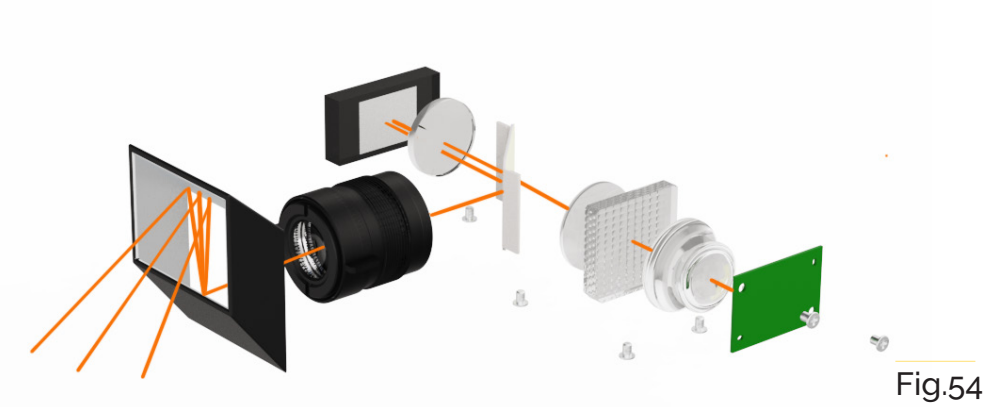


Fig.54

3.Through the two reflections of the reflector, the projected image becomes larger, which means that the projection distance is reduced

# 8.5 Games

## 8.5.1 Modeling Line Friends

Modeling Line Friends is a game of kneading plasticine, Real-IN will project the shape of each part that needs to be modeled on the desktop.The kids just need to model each part and place it in the corresponding position, and projector will enter the next step. Until they form a complete character and put it in the designated position,

*Fig.53 : Light path diagram*
*Fig.54 : Light path diagram*

the game is completed.

*Fig.55 : Game interface*

## 8.5.2 Little dinosaur taking a bath

Little dinosaur taking a bath is a puzzle game. Real-IN can project different puzzle games from easy to difficult. Children just need to put the physical puzzle card in the corresponding position on the desktop and form a complete picture with the projection screen to enter the next level.

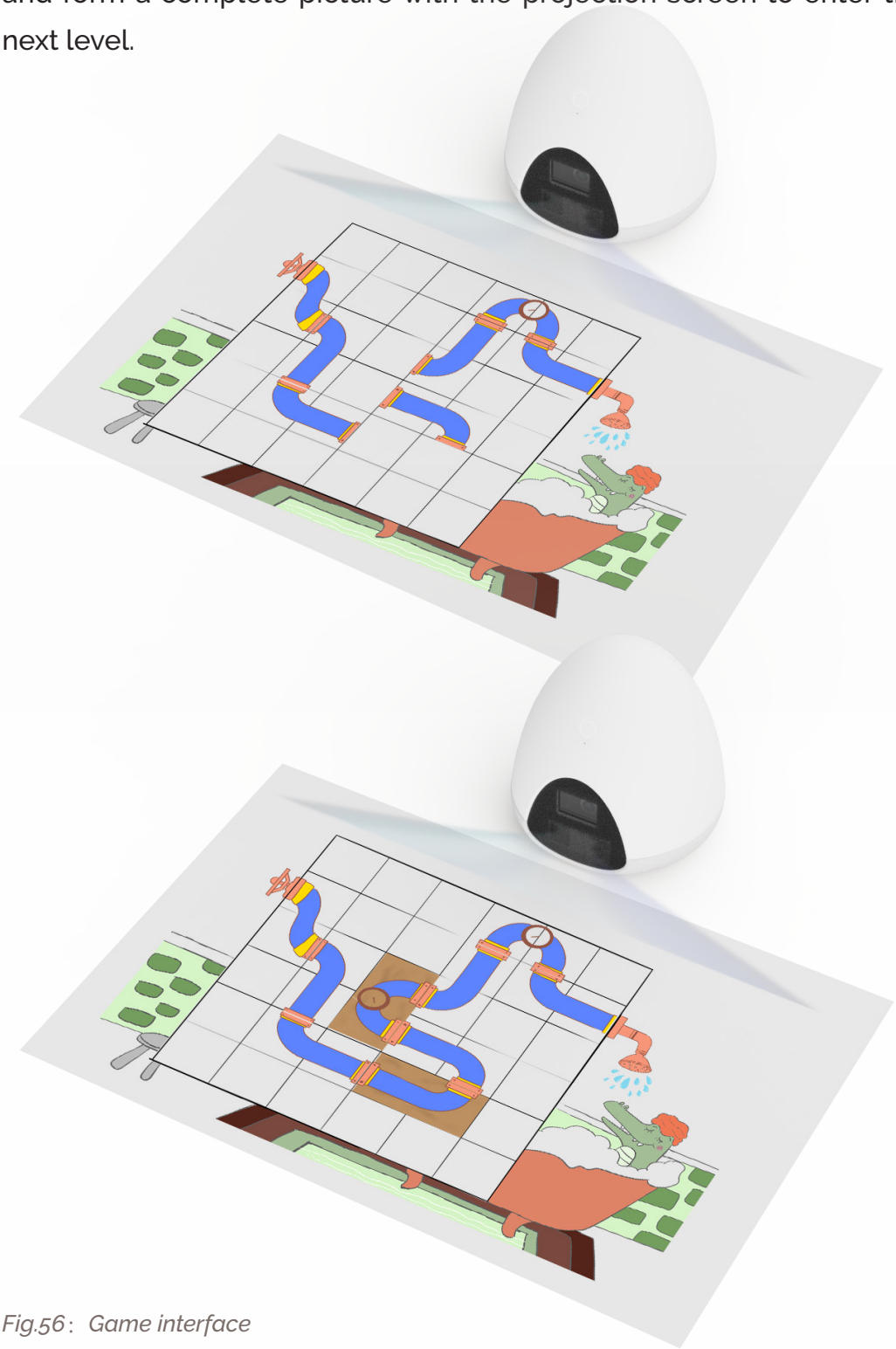


*Fig.56 : Game interface*

## 8.5.3 Football Match

Football Match is a two-player game. The projector is used in conjunction with the kit, which includes a frame with elastic cords on both sides and 20 "football", ten per person. As the difficulty of the game increases, the number of bombs will also increase. When ejecting a “football”, you must avoid obstacles.


*Fig.57 : Game interface*

## 8.5.4 Tangram

Tangram is a three-person game, After pressing the start button, the timer starts and the camera recognizes that the child who completes the pattern first wins.

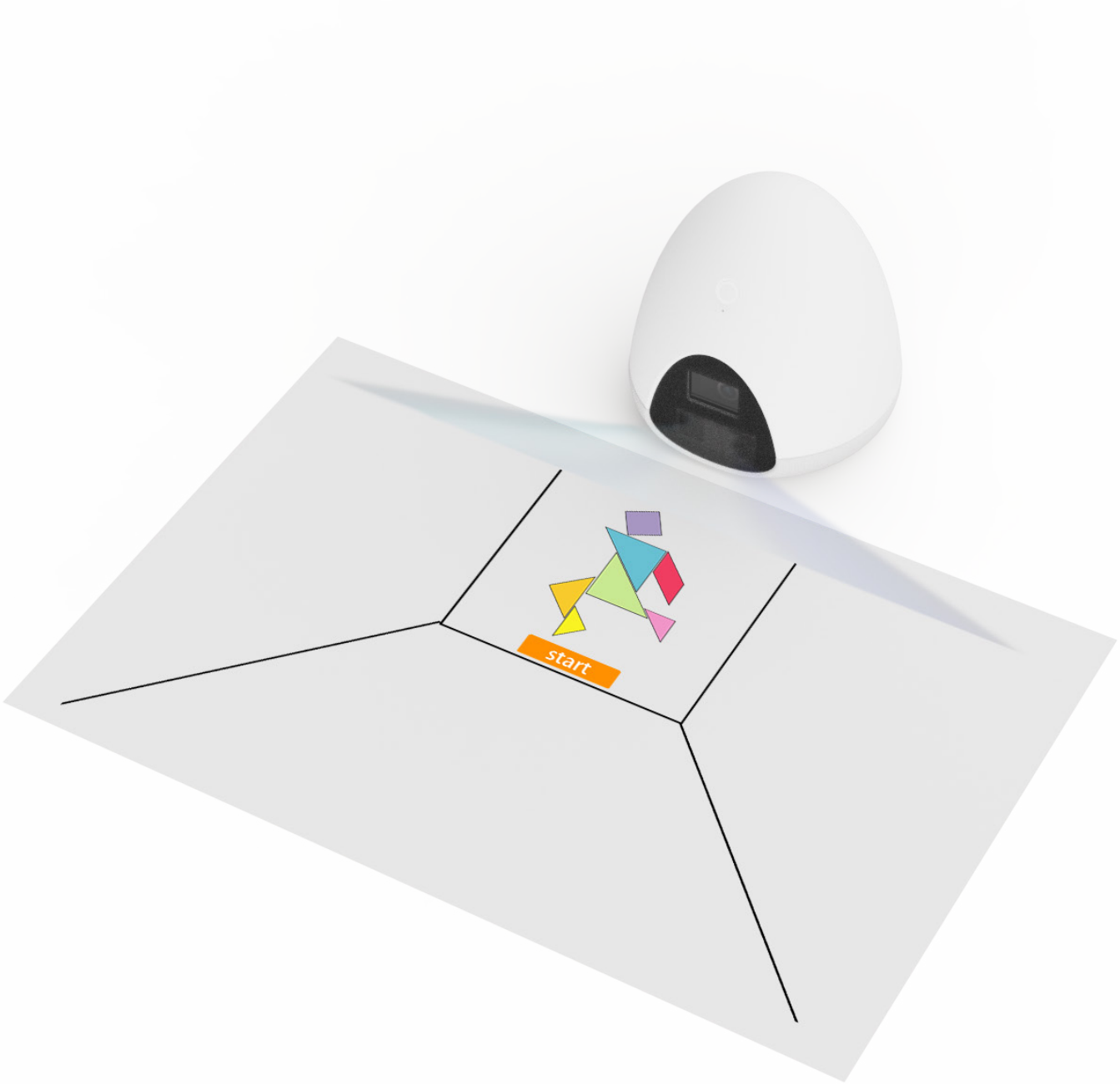
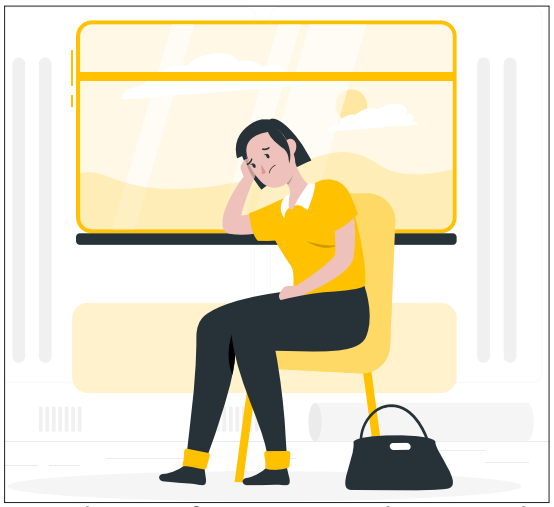



*Fig.58 : Game interface*

# 8.6 Storyboard

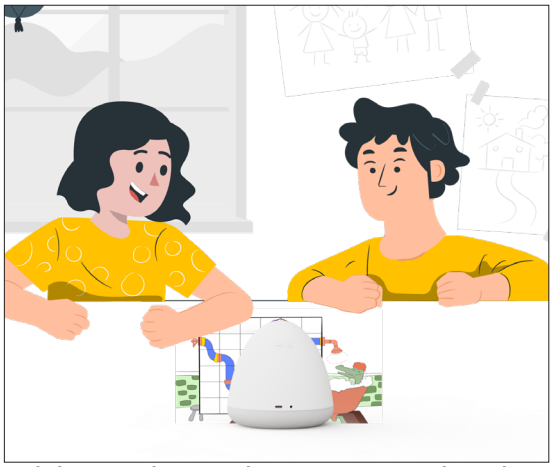
Anna lives with her parents and brother


Mom and Dad are very busy at work, most of the time she stays at home with her younger brother, she watches TV alone, while her younger brother usually plays on the iPad. They barely communicate

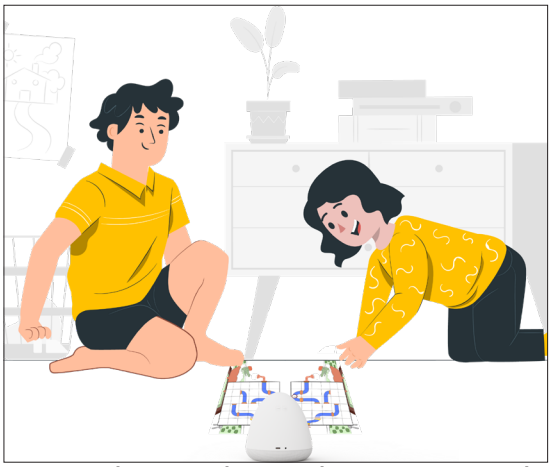


As they often use electronic products, parents are very worry about the impact of electronic products on the body and mind.

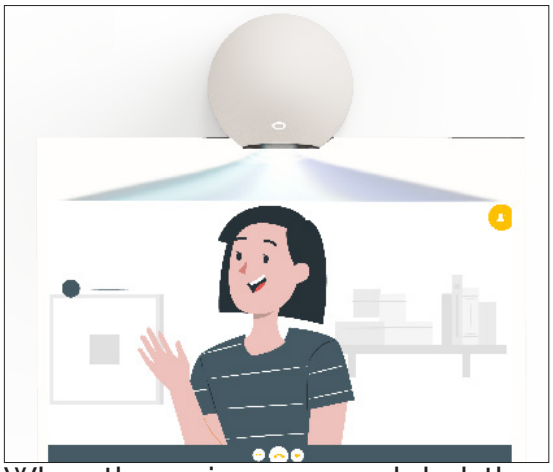
One day Mom and Dad brought them back Real-IN



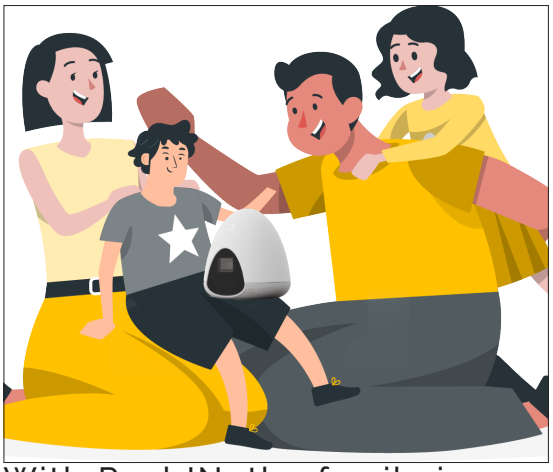
With Real-IN, the communication between Anna and her brother has increased and they will also work together to complete some levels in the Real-IN game.



Sometimes they also use Real-IN to play some fighting games, with Real-IN they almost don't play mobile phones or ipad anymore.



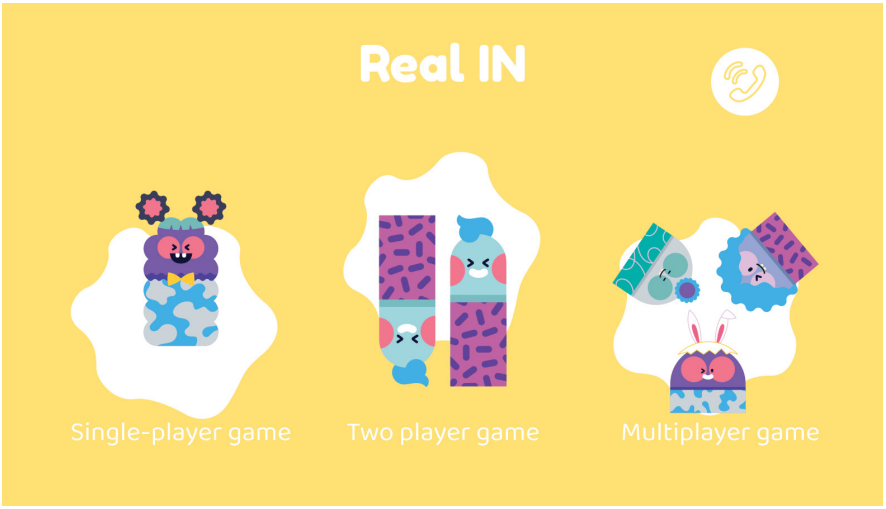
When they miss mom and dad, they use Real-IN to call mom and dad.



With Real IN, the family is very happy: Mom and Dad no longer worry about their children being addicted to electronic products, and the relationship between Anna and her younger brother has become closer.

# 8.7 Interaction

The interface design style is more lively, using a variety of colors with higher saturation. The interface mainly includes: main interface, single player interface, two-player game interface, multiplayer game interface and video call interface.



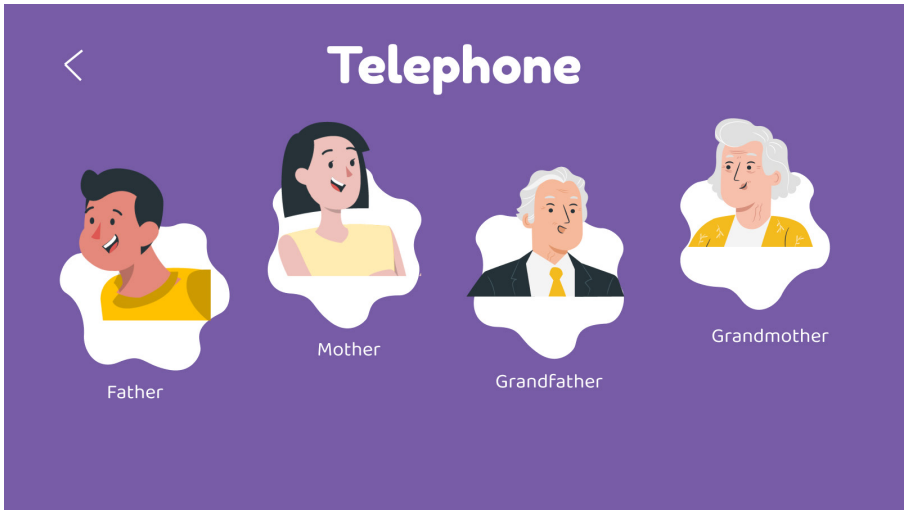




*Fig.59 : Product interaction interface*


*Fig.60：Product interaction interface*

# Conclusion

After conducting an in-depth investigation and analysis of the current situation of contemporary children, I found that electronic products in today's society are strongly attractive to children, but due to social environment and other factors, it is almost impossible for children to stay away from electronic products completely.

Therefore, the function of Real-IN is to use the combination of virtual projection and physical accessories to bring children's attention back to reality to a certain extent, help them discover interesting things in real life, and reduce their dependence on the virtual world.

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