Furniture design based on parent-child interaction experience

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Abstract. To explore how children's furniture can become a tool of parent-child interaction, so that furniture can not only satisfy children's curiosity, but also bring new feelings and experiences to parents and children. It is necessary to establish a bond of love between parents and children by adding parent-child interaction projects. This children's furniture will give children a warm family life experience. Background analysis of parent-child interaction furniture design was conducted by means of data search and market research to explore children's physiological and psychological characteristics. It is necessary to analyze parent-child interaction mode and its elements and try to make compound chairs have interactive functions so that compound chairs can bring good interaction experience to parents and children. As a result, this compound chair can meet user needs. The design features of parent-child interactive furniture are analyzed with the physiological characteristics of children as the design elements. Personally interactive furniture can create an interactive world for children and parents in a limited living space. It is able to promote the emotional exchange between parents and children, create a space conducive to children's physiological and psychological growth. Ultimately, this kind of interactive furniture can promote the physical and mental health of children.

1 Introduction

Parent-child interactive furniture is an innovative design concept in today's home furnishing industry. The core lies in the design of home products that can meet the needs of parents and children's interaction. It fits the lifestyle and promotes children's physical development, mental health and emotional exchanges between parents and children. Because parents are children's first teachers, furthermore, they are the closest friends of children.

However, in most families in the city, many parents are busy in work. When the parents return home, they are entangled in family chores and lack of time and energy to get along with the children. In addition, electronic products emerge in an endless stream in the information age. In fact, many adults addicted to their mobile phones, children are also attracted by online games and mobile apps. In the remote countryside, there are many left behind children who are separated from their parents for a long time, and the communication and emotional communication between parents and children are increasingly reduced. This kind of life style separated from parent-child interaction not only causes physical fatigue of children, but also can not stimulate children's desire to explore the environment and knowledge, which is not conducive to the healthy development of children's body and mind.

2 The innovative application of interactive design concept in furniture design

Furniture is a necessary product in family daily life, and it is the carrier of various activities and behaviors[1]. The guiding concept of furniture design has gone through various stages, from the initial "product service to function". The concept of furniture design will go through all stages. The original form is summarized as "product serves function". And then after the arts and crafts thought in the late 19th century and pop art in the 20th century, it has developed into a diversified modern design theory. We can see that with the improvement of people's living standard and value orientation, the aesthetic and connotation of furniture design has changed significantly.

The concept of interactive design is a study that emphasizes the interaction between people and objects[2]. In the furniture industry, the concept of interactive design is a very valuable guiding concept, which can guide designers to combine people's life style with furniture production. It can promote the communication and interaction between people and furniture, and improve people's family life taste. Interactive design concept can promote the innovation of home design, mainly reflected in the following aspects:

The concept of interactive design emphasizes theme and innovation in the forms of expression. The way of interaction between people and furniture and the spiritual

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connotation to be conveyed are also varied. Thus, the design of interactive products should be presented with a certain themes, with emphasis and flexibility. Theme design reflects the designers' thinking and exploring process in interactive experience. Furniture design not only meets the needs of basic family activities, but also extends the value beyond the functional design to expand the innovative elements of furniture in a diversified and personalized form.

The concept of interactive design emphasizes sensory and psychological activities in the way of interaction. Furniture is not only an objective functional product, but also has vitality. Through the interaction and experience of vision, auditory, touch and other multiple senses, it creates a harmonious sense between people and environment.

The concept of interactive design emphasizes the user oriented theory in the service object. Traditional furniture design is endowed with functions by designers, and users passively accept the service provided by designers. In the concept of interactive design, designers and users no longer draw a clear line. Furniture users are the second designers of furniture design. They can feedback, optimize and even recreate the use of products.

The concept of interactive design emphasizes emotional communication in spiritual connotation. With the accelerated pace of life, people are suffering from heavy work pressure and life pressure, and there are less and less communication between people. Therefore, the interactive design of furniture can promote the emotional communication between family members. On this basis, in-depth dialogue and communication can be carried out between relatives, which can shorten the distance between people's hearts [2].

3 Market background and research of parent-child interactive furniture

At present children's consumption market is a huge market with great business opportunities and vitality. Consumption of children plays an important role in the whole family[3]. According to experts' prediction, in the future, Children's consumption will have a market scale of 100 billion. Therefore, in recent years, parent-child interaction and parent-child education have become more and more important in the society and family, and the related research is very extensive. Environment and facilities that meet the needs of parent-child activities have been derived at home and abroad. From the perspective of the market, there are many household brands for children's design. These brand furniture can start from the characteristics of children, meet the design of ergonomics and the daily life needs of ordinary families. For example,

A children's furniture brand called ABC has designed a bed for parents and children, which is different from the conventional bunk beds. This kind of furniture not only has the function of bed, but also has the function of multiple closets and storage cabinets, which can be divided and combined, and can effectively solve the problem of children's separation when they grow up.

Fig1. Parent-child bunk

However, these furniture brand products are usually only designed for children and their functional structure is relatively single, which can not provide a good atmosphere and platform for parent-child interaction. In this context, parent-child interactive furniture came into being. It provides interactive facilities for parents and children in the family residence like a small "playground" at home. It sends thoughts on the design of parent-child interactive furniture, which can not only meet the needs of daily home, but also cultivate children's hands-on and brain skills. It has good entertainment and education expansion functions. It can guide parents and children to communicate and interact, so that parents and children can fully feel the interaction of family affection, and establish a bond of love between parents and children.

In order to make the society's views on parent-child interactive furniture understood better and prospect of parent-child interactive furniture. I compiled an online survey questionnaire which collected nearly 200 valid data from families. In the conclusion of Figure 2, nearly 90% of parents have a strong interest in parent-child interactive furniture, which comes from the internal demand for children to obtain family happiness. At the same time, figure 3 shows that most parents lack in understanding of parent-child interactive furniture.

The survey shows that parent-child interactive furniture has a good social demand and market prospect. While it puts forward higher requirements for furniture designers to conceive and design more innovative and dynamic interactive home products.

Are you interested in parent-child interactive furniture ?

Fig 2. Research on the demand

Do you know about parent-child interactive furniture ?

Fig 3. Research on the understanding

4 Elements of parent-child interactive furniture design

The design feature of parent-child interactive furniture is to establish a household system in line with the characteristics of children. It is adopt interactive form, and taking into account the family applicability of the family[4]. The core advantage is to build a bridge between parents' and children's love in daily home life, which could give children the inspiration of entertainment and the soul of growth.

4.1 Physiological and psychological characteristics of children

Children are the main part of parent-child interaction. The design of parent-child furniture should be based on children's nature and conform to the general law of children's physical and mental development[5]. Access to relevant information, the physiological and psychological characteristics of children aged 3-6 are shown in Table 1.

Table 1. Psychological and physiological characteristics of children aged 3-6

psychological characteristics	Physiological characteristics
Have a strong thirst for knowledge and curiosity.	They learned to walking, running and jumping, these movements are gradually coordinated.
Sensitive to color and shape, start to master cognitive methods and have certain thinking ability.	Be able to understand most of the dialogue, listen to songs and speak simple sentences.
Have preliminary aesthetic consciousness. Can consciously carry out artistic conception [6].	Like to imitate other people's actions, can use tableware to eat.
Have their own opinions and independence.	Be able to follow the rules and participate in game activities.
Can have some restraint in the mood and produce the psychology of fear under certain situation.	Children can balance themselves when jumping from a certain height and stand still. They like the outdoor environment.
The initial formation of personality, plasticity.	Children can draw pictures, fold papers, match building blocks and climb with both their hands and brains.

4.2 Principles of parent-child interactive furniture design

The following principles should be considered in the parent-child interactive furniture design, as shown in Figure 4.

Fig 4. Design principles of parent-child interactive furniture

Safety: safety is the most important element of design. Children have a lively and active nature, nevertheless their self-protection awareness is far from enough, which is also the point that many parents are most concerned about. Hence safety is the premise of all design. As a furniture, it must have a stable structure and sufficient strength which can ensure that children do not topple or break during the play. Secondly, the shape of the furniture should be safe, without sharp corners and the elements such as glass and mirror that may cause harm to children should be eliminated [7]. In addition, choose material safety also is very important, the material of children furniture must pass the national green safety certification to be green and pollution-free.

Practicability: the design of parent-child interactive furniture should take practicality into account, and do not

abandon the attributes of furniture. Therefore, not only the interaction between parents and children should be fully considered, but also the cost performance, such as occupation area and time limit are the key indicators of practicality.

Interactivity: furniture is a material carrier which plays an intermediary role. By using parent-child interactive furniture, we can create opportunities for parent-child communication and cooperation, and increase the tacit understanding between them. The most common parent-child interactive furniture can be divided into sports type, game type, leisure type and activity type. See figure 5.

Fig 5. Classification of parent-child interaction

Particularity: boys and girls have different ways of living and interaction. Boys prefer logical, three-dimensional and interesting interactive furniture design, while girls focus on sensory, color and richness of furniture design. In addition, children's personality and hobbies are also special factors of parent-child interactive furniture design.

with sports style is designed. Since children like outdoor exploration games, they can learn from such game mode to play simple game at home. Product which meets the basic seat function and provides the parent-child interaction space, while let parents and children get the sense of participation and warm experience of daily family activities.

5 Practice of parent-child interactive furniture design

Based on the above design concept and design elements of parent-child interaction, a parent-child interactive seat

5.1 Design orientation of parent-child interactive furniture

The design orientation of parent-child interactive furniture in this design should consider various comprehensive factors, as shown in Figure 6.

Fig 6. Design orientation of parent-child interactive furniture

In the design process, it is considered to take the seat as the carrier, integrate into environmental exploration projects such as climbing, drilling caves, etc., so as to establish personalized and versatile seat products. Safety is the basic requirement of design, so the form design must not be too complex, and the final form of design should have a simple and harmonious warm family style. The basic material of the seat is pine, which is determined as environmental protection furniture by the Ministry of culture and culture of the United Nations. It is solid, light and durable [8]. All edges and corners of wood must be rounded and smoothed to prevent scratches. In addition, felt and cloth are added to package in the design process, so that both safety and comfort are taken into consideration. The diversity and individuation of functions determine the price ceiling of products. The process of children's development is divided into different stages. The target users of this design are 3-6 years old children in early childhood. During this period, children are active and do not have heavy homework, which is the key period of character cultivation. Furniture positioning belongs to mid-range household products, with a price of 1000 yuan. Most families can afford it.

5.2 Details of parent-child interactive furniture design

"Indoor amusement park" is the theme of this interactive furniture. The design inspiration comes from the children's entertainment facilities in the shopping mall, which integrates the innovative elements of rock climbing and cave, making children feel novel. The back of the seat is made of rattan and rope, green and environmental protection. This product uses wood panel for splicing, which is stronger and more stable than ordinary seats. Shape is simple without sharp corners. Children's sensory system is very sensitive, bright colors are more likely to arouse their interest[9], so the color of the rope is design to be red. The seat cushion and the corner are pasted with the dirty resistant gray felt. The gray felt and the red rope complement each other. The joint of the wood board is pasted with the Red Lace felt, which is full of children's interest. There is also a high and large cave for children behind the chair. Figure 7 is the structural diagram of

parent-child interactive seat, with the appearance dimension of 1.2 * 0.7 * 1.0m.

Fig 7. Basic structure of parent-child interactive seat

The design includes many elements such as light, sound, electricity, mechanics, etc., which could increase the fun and diversity of parent-child interaction from the perspective of vision, auditory and other senses [10]. Visually, the decorative light string adopts LED light strip, which can select a variety of colors to make the seat appear fashionable and colorful. LED with low voltage and small size is relatively safe. In terms of hearing, Bluetooth speaker is hidden in the dark design of wood board. You can choose music, spoken English or fairy tales to bring better hearing experience to children.

The seats reserve space for expansion. Parents and children can act as second designers to give their own parent-child interactive furniture unique inspiration and design elements. Dynamically, the interactive furniture adopts a folding and extending design architecture, which can have a variety of shapes[11]. Statically, the DIY function of painting and weaving can be added. When parents are reading books or watching videos, children can draw pictures and play small games.

From the emotional point of view of parent-child interaction, rope is like a bond of love to weave parent-child families. All kinds of entertainment facilities facilitate warm interaction and play between parents and children. And speaker devices enable children to get education in happiness and interest[12]. A little bit of starlight adds a touch of warmth to it, immerses children in their own small world, and makes the family

environment warm, colorful and enjoyable. Figure 8 shows the effect of parent-child interaction.

Fig 8. Effect picture of parent-child interactive seat

6 Summary

It is concluded that parent-child interactive furniture is a kind of functional and interactive household product, which can create a good parent-child interactive experience in the limited family space. This product could not only let children get the inspiration of entertainment and learning, but also deepen the feelings between family members in the interaction.

The designer needs to take children as the design goal and design products that conform to children's naive and lively personality from the aspects of safety, practicality, interest, etc. The detachable versatile parent-child interactive seat can not only provide a comfortable seat environment for parents, but also provide diversified entertainment items for children. It is also an exercise tool to practise the children's senses of their visual, auditory, tactile. Furthermore, it can create a growth environment beneficial to children's physical and mental health.

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