

# Research on the Personalization and Humanization of Projectors for Children

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**Abstract:** Children's Projector is an item that guides children to learn dynamically and enhances parent-child communication. This article uses children as the background to personalize the Projector to study the benefits of Projector for parent-child communication and the positive effects it can bring to children. Only in this way can the benefits of Projector for children be shown, and the importance of Projector in children's education be shown. Conclusion: From the perspective of children as the background, we can deeply explore the personalized research of Projector, improve the applicability of children's Projector for children, and thus effectively enhance the positive effects of Projector on children.

**Keywords:** Children's education, Projector, Product design, User experience map, 5W2H.

## 1. Introduction

Home projectors have been a very popular product in the past three to five years, followed by children's projectors. Many parents tell stories to their children before bed, and children's projectors have gradually become a popular product. Telling stories to children has a great impact on their language ability, knowledge reserves and parent-child relationship. Telling stories to children can make them reserve more knowledge content, and the influence on children's habits is a lifelong companion. This is not just storytelling, but a lifelong learning habit. It also makes children more willing to talk to you during the communication process with you, and can better communicate his inner thoughts with you, which is also beneficial to our education of children. And dynamic stories can make children accept things dynamically and develop their brains faster.

The fundamental purpose of product design is to take user needs as its own responsibility. Whether a product can meet the needs of users is one of the requirements for qualified product design. [1] One of the signs of design success. People are now more unable to accept some cold and impersonal products, but are more receptive to those good-looking products that are more in line with different personalities and different needs. [2] The design method of sensory engineering is to focus on user needs and research and develop products based on the user's personal preferences. It is also a "people-centered" design method. [3]

## 2. Research Process

### 1. Bionic design

Bionic design is a comprehensive discipline that integrates design content and bionic content. [4] Different from bionics, the main research object of bionic design is the "color", "sound" and "shape" of objects in the living environment. By selecting and processing them, more specific design work can be completed. The concept of bionic design has been effectively applied in China. Designers have made breakthroughs in the rules of simple formal beauty and used bionic design techniques to break the boundaries between artificial products and humans, thus creating an interesting

environment. [2]

### 2. User Experience Map

The user experience map is a tool that visualizes the interaction between users, services, and systems in an experience from the perspective of different customers. As a visual diagram that shows the individual experience of users, it is used to study user behavior in a given field and reveal the relationship between people, places, and things in service design. The user experience map is a visual way to show the individual experience of users in stages.

User experience map (Figure 1), the key points of the user experience map are as follows: satisfaction, user behavior, pain points, opportunities and contact points. [6] By analyzing the various components in the experience stage (S1, S2, ..., Sn), we can gain a deep understanding of user needs, discover pain points in the service process and define service opportunities.



Figure 1

Play a vital role in design research and the exploration of users' inherent needs. [7] For example, the user experience map created by Chris Risdon (Adaptive Path Team) for European railways helps service providers understand all the touch points of users during the experience stage, so as to explore design opportunities and provide users with a better service experience. [8]

### 3. 5W2H analysis method

Another name for the 5W2H analysis method is the Seven Whys Analysis Method. It consists of two English words with the first letter H and five English words with the first letter W:

Why, What, Where, When, Who, How, and Howmuch. These words are used to ask questions, find clues on how to solve the problem, find solutions, design ideas, and achieve the expected goals. This is the 5W2H analysis method.<sup>[5]</sup>

### 3. User Experience Map

Customize the user experience journey map based on the stories users tell their children, discover user needs, observe user behavior, observe user emotional experience, and seize pain points and opportunities.

#### 1. User Research

Users' expectations and requirements for products are not just superficial requirements for product functions, but also include their psychological and physiological needs and potential needs for a social position and social identity. [9] (Tang Lingjie)

Based on the scenario simulation method and the interview method, it can be seen that there are still many user needs in the use of children's Projector.

After analysis, the user needs are as follows:

- (1) Tell stories to children.
- (2) Choose books independently.
- (3) Cute appearance, children like it.
- (4) Highly interactive.
- (5) Light timing.
- (6) Number of books.
- (7) Book size.
- (8) Easy to use and simple to operate.
- (9) Projector off when the light is too dim.
- (10) Happy hour is needed.

#### 2. User Experience Map

To conduct a visual analysis of each stage of the experience of parents and children, such as entering the door, turning on the lights, going to bed, finding books, telling stories, ending stories, and turning off lights, in order to explore experience design opportunities. Taking the user experience map research of the parent's book-finding stage as an example, it is found that the main experience pain points of parents in the book-finding stage include long book-finding time, too many books, not being able to find the desired books, story restrictions, etc. Based on this, the design opportunities of designing a simple-operation Projector, optimizing the interactive interface of the story-finding equipment, and the Projector system are proposed (Figure 2).

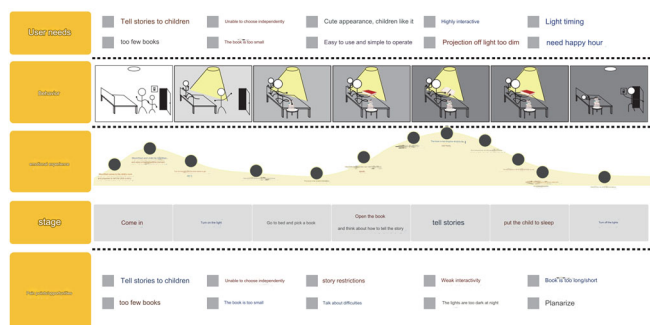


Figure 2

#### 3. User emotional experience

Emotional experience can be divided into several stages (Figure 3): entering the door, turning on the lights, going to bed, finding a book, telling a story, ending the story, and turning off the lights.

Identify product opportunities and pain points based on the user's emotional experience at each stage. As shown in the figure, the lowest emotions are when choosing books and thinking about how to tell stories. Therefore, in the future,

random book selection, random story selection, as well as cartoons and audio can be added to product design to make up for previous pain points.



Figure 3

#### 4. User needs

After analyzing the user's emotional experience and scenario simulation method, the following ten user needs can be proposed:

- (1) Telling stories to children
- (2) No independent choice
- (3) Limited number of stories
- (4) Weak interactivity
- (5) The book is too long/short
- (6) There are too few books
- (7) The book is too small
- (8) Difficult to tell
- (9) The light is too dim at night
- (10) Flat

### 4. Design Positioning

In response to the above prominent contradictions, we decided to design a luminous children's Projector storytelling machine. Many products related to children are designed from the perspective of parents and relatives, that is, based on the subjective needs of consumers. The sales volume of such toys may be very high, but it meets the hobbies of parents and relatives, but cannot meet the needs of children who actually use the products. [1] We should pay attention to the needs of children themselves, and determine the design goals by thinking about how to solve them with design.

#### 1. Design positioning

In the early stage of design, the focus is mainly on children. Through early analysis, we first combine the needs, then customize the functions, and integrate the appearance design according to the structural needs. In the entire design scheme, the positioning is as follows:

(1) We want to develop children's thinking ability, communication and cooperation ability, knowledge expansion ability and other abilities, and hope that this toy can grow with children. In the concept design, sketches and renderings are mainly used to express it, and finally the implementation plan is carried out into structural design and process design.

#### (2) User positioning

The target group is children aged 3 to 12. They are in a period of rapid growth in intelligence and emotional intelligence, and both the toddler stage and the childhood stage are important stages for forming good habits.

#### (3) Product usage environment

Home environment, indoor environment.

#### (4) Advantages of using the product

In terms of entertainment: the first thing to consider is fun, only if it is fun will it be loved by children. The operation is simple and the interaction is strong.

#### 2. Design process positioning

From the perspective of product design theory, product design and development requires a rigorous scientific design procedure, and design activities are carried out according to customized time schedules, design methods, design purposes, etc. to ensure the greatest success of design product development. It is mainly divided into three parts: the first is to propose the concept of the problem, the second is to

visualize the concept, and the third is to commercialize the visualized design. In the first stage, the problem is conceptualized, and design investigation and analysis and design positioning are carried out. In the second stage, the concept is visualized, a product sketch is designed, and a suitable model is selected from multiple schemes for further deepening. The third stage is to commercialize the design, design the product structure, produce engineering drawings, and then go through several experimental tests and trial production.

### 3. Design Analysis

#### (1) Functional design analysis

In the previous chapters, the growth characteristics of children were analyzed, and the core functions of the author's program were obtained as follows.

Basic mode: including music and story mode.

Lighting mode: It can be used as a night light. It lights up when you open it, enhancing the interaction between children and the product.

Gesture recognition/tracking/motion mode: In order to enhance children's physical movement, a following function is also designed. The product will provide sound and image feedback based on the recognition of movements.

#### (2) Design analysis

Highlighting aesthetics When designing a scheme, the aesthetic drive needs to take into account the psychological characteristics of preschool children. As children's physiological and psychological characteristics continue to mature, their understanding of things gradually improves. They not only have functional and learning thinking, but also have the understanding and thinking of artistic beauty.

Therefore, this product chooses an arc-shaped appearance, which can enhance the attraction between children and the product and strengthen the interaction ability of the product.

## 5. Design Process

According to the above product definition, the author has already defined the product - children's story projector. At this stage, the author carried out the following steps: 1. Discover and clarify the problem 2. Develop a design plan and determine the final design plan. 3. Always make it clear: using different materials and structures can produce different design plans; all design ideas and products will have more possibilities for improvement, and the most suitable plan will never be just one. 4. Collect information to understand the characteristics of the product to be designed. Then, summarize the research results. 5. Design analysis. 6. Plan conception. 7. Plan presentation.

#### 1. Divergent design thinking

In the early stage of design, we searched for many similar products, and on this basis, we diverged our thinking, drew some sketches, and carried out sketch deduction. The hand-drawn sketches are mainly based on bionics, which can enhance the product's appeal to children. The shape is mainly round, and after the abstract shape evolution, the specific shape in (Figure 4) is obtained.



Figure 4

#### 2. Refinement of the plan

Based on the sketch deduction, several options were selected for discussion and selection. (Figure 5)



Figure 5

Five products were selected for discussion and selection. The selected products are in the shape of a pony, which can have dynamic shaking and can interact with children. The airplane-shaped product can rotate the fan blades when the Projector is playing. The unicorn-shaped product has a simple and honest body, a small and cute shape, which attracts children. The ladybug-shaped product can light up at a fixed time when the wings at the back are opened, and the Projector can come out from the head. The simple and honest body is likable. The last shape is a whale-shaped product, and the water spray on the whale can light up. When it is a starry sky light, the whale is round and cute.

Finally, we chose a ladybug-shaped product for further investigation.

#### 3. In-depth study of the plan

In the early stages of the plan, the size of the product was determined based on the product's characteristics and children's needs.

At the beginning, the opening and closing method of the wings of the product became the focus of discussion, and the opening and closing method was finally determined to be the diagonal upward joint opening and closing method. As for the button method of the product, in the early design stage, it was chosen to pull off the head as the external remote control of the product. Later, considering that pulling off the head would cause a bad influence on children, we finally chose to build an external suction combination component, which is shaped like a small ladybug, delicate, suitable for children to use in their hands, and also suitable for parents to hold in their hands (Figure 6).

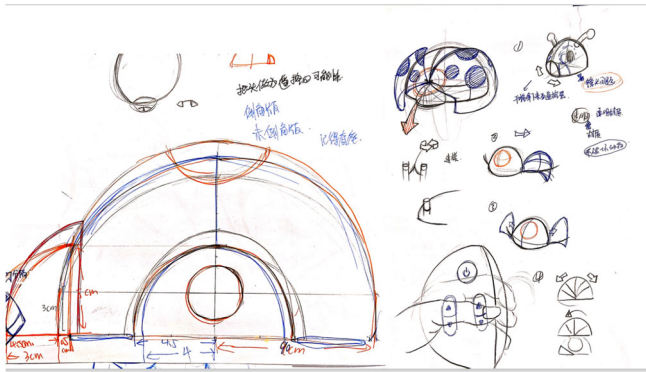


Figure 6

The sketch was then refined, and the opening and closing method and lens position were discussed and confirmed in detail. The lens is located at the front of the product, which is the head of the ladybug. The front of the product is the Projector head, so the head of the product is made of glass (Figure 7).

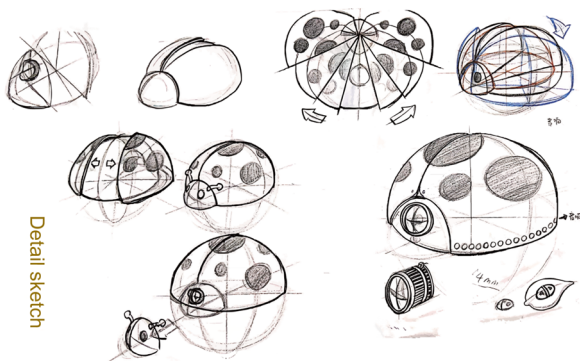


Figure 7

#### 4. Determine the material and size

##### (1) Material selection

The texture of children's products will be different because of the different materials. Different materials will act on children's visual and tactile senses. Products with a hard touch will make children feel tense and unhappy. On the contrary, soft products will make children relax and feel comfortable and happy. Therefore, once the child is emotionally unstable and has difficulty falling asleep, let him touch the soft product to gradually relax his emotions.

ABS plastic is selected for the material design of this solution, which fully utilizes the dense, delicate and smooth characteristics of plastic materials. Combined with the curved shape, children can feel the smoothness and are not easily injured while playing. The design material of the bottom of the product and the ladybug half are made of silicone. Silicone has good elasticity and can play an anti-collision function. In addition, the plastic material produced by high technology is both environmentally friendly and non-toxic, which meets the requirements of children's use, and fully demonstrates the safety of this solution (Figure 8).

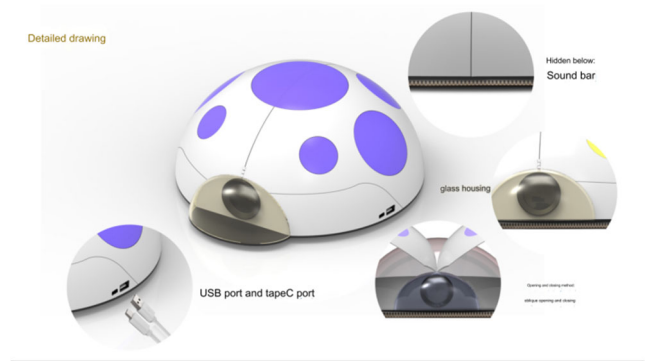


Figure 8

##### (2) Size selection

Considering the size of children's hands, the author remodeled and rendered the toy's final plan, and the dimensions of the toy's final plan are 300 mm\* 350 mm\* 60 mm.(Figure 9)

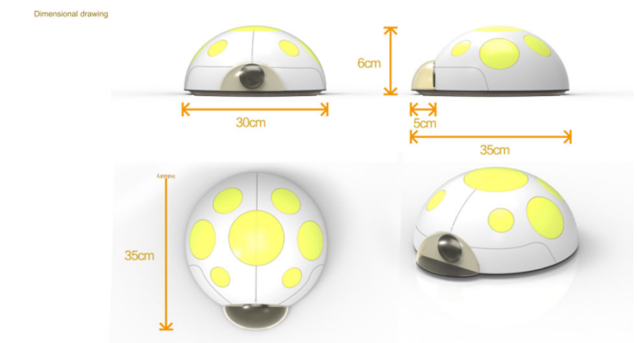


Figure 9

## 6. Conclusion and Development Prospects

This article focuses on children's projectors, takes children as the research object, analyzes the current status of children's Projector, explains the relationship between children's projectors and children's growth, and takes this as an opportunity to design children's projectors. From the perspective of children as the background, we will deeply explore the personalized research of Projector, improve the applicability of children's Projector for children, and thus effectively enhance the positive impact of Projector on children.

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