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Emotional Design of Smart Products for Children's Drawing

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Abstract: At the present time of the information society surrounded by scientific and intelligent technology, it provides young families with many new products that can be cultivated at preschool age, among which children's drawing is the one that has a lot of research value and design appreciation. This thesis investigates the emotional design of children's drawing intelligent products, aiming to provide a drawing tool that is beneficial to children's emotional development. By combining advanced artificial intelligence technology and emotional design principles in a holistic system, offline children's drawing products are researched and discussed. Based on the difficulties faced by children in preschool education, their physical and mental development, the relationship between parents and children, and the environment for children's painting, this article analyzes the social problems and shortcomings faced by children's painting in home design. It designs offline intelligent painting products to solve the cleaning problems faced by parents at home, and further designs painting products using children's graffiti and casual graffiti. The study employed user research and fieldwork to assess the impact of the product on children's emotional expression and creativity. Emotional design is important for the development and application of children's drawing smart products and has a positive impact on children's emotional development and creative thinking.

Keywords: Children's Painting; Intelligent Products; Emotional Design; Creativity

1. Introduction

1.1 Background and Significance of the Study

Children visually express their thoughts and feelings through drawings and paintings [1]. While learning language and thinking skills, children develop a keen interest in everything around them and express their emotions by drawing. Children are unrestrained and have no rules and regulations when they draw, which creates the unique characteristics of childishness, dreaminess and absurdity. Young children's paintings reflect the beauty of childishness and naivety that adults can never experience.

Preschool is a prime time for developing creative thinking [2], Drawing for young children plays a very important role in fostering their physical and mental health, habits and intellectual development. It promotes the healthy development of children and enables them to establish a correct outlook on life, values and the world, thus improving their overall quality. Emotional design is a design method that pays attention to and is oriented to the emotional needs of users, which can make the product more in line with the psychological expectations of users and improve user satisfaction and product usability. In children's drawing intelligent products, affective design can provide children with a more pleasant, interesting and creative drawing experience, and promote their emotional expression and cognitive development. Therefore, it is of great practical significance to study the emotional design of children's drawing intelligent products.

1.2 Main Research Content and Methodology of the Subject Matter

Every child has his or her own distinctive creativity and imagination, and every child's nature is something that should be protected. Children's drawings vary from stage to stage and can be very different. The age of the child influences the drawing to show different characteristics, and the psychological expression is also different. Different environments have different influences on painting, and families will desire to paint together with their parents. A good parent-child relationship facilitates children's acquisition of a variety of basic knowledge, skills, values, and social interaction

skills needed to interact and communicate with others [3].

The main research methods used: literature research method, comparative research method, summarization method, to understand the basic situation of children's painting and to grasp the real needs of children in painting. To understand the changes in the drawing environment of children of different ages, as well as to understand the different perspectives of how parents at different ages view their children's drawing. According to the stage theory of children's drawing development: before the age of 3, children's drawings are in the stage of "action representation" or "pre-representation" without modeling; at the age of 3-4, they enter the stage of "graphic representation" and begin to consciously use patterns to express their feelings. Children begin to consciously utilize patterns to express themselves [4].

2. Research and Analysis

2.1 Analysis of Children's Emotional Needs

Children's emotional needs are an important part of their development as they grow. Emotional needs not only include a basic sense of security and belonging, but also involve expressing emotions, experiencing pleasure and creative development. In children's drawing smart products, emotional needs are manifested in the pursuit of creativity and expression, respect for individual differences and autonomy, and the desire to cooperate and share with others. In addition to aesthetics, ease of use and fun, children's emotional care products need to help children understand and manage their emotions, improve their ability to express their emotions and cultivate a positive mood and mindset, and at the same time, they need to consider the development of hands-on skills, responsibility and autonomy, and cultivate children's creativity and decision-making skills through the design of challenging, inspiring and participatory functions [5].

2.2 Principles of Emotional Design

(1) Create a positive emotional experience: Children's drawing smart products should create a positive and pleasant emotional experience through interface design, sound effects, graphics and other aspects, so that children can feel happy, excited and satisfied.

(2) Respect children's individual differences: Children's drawing intelligent products should provide personalized functions and options, allowing children to make free choices and creations according to their own interests and abilities, so as to meet the needs of different children.

(3) Promote emotional expression and communication: Children's drawing smart products should provide rich expression and communication opportunities, and help children express their emotions through graphics, voice and other forms, as well as share and communicate with others.

2.2.1 Emotional Design Approach

(1) User participation and feedback: In the design of intelligent products for children's drawing, children's opinions and feedback should be fully considered, and they should be encouraged to participate in the design process to ensure that the products meet their emotional needs.

(2) Storyline design: By designing interesting storylines, children can participate in the painting process, generate emotional resonance, and stimulate their creativity and imagination.

(3) Emotional interaction design: Utilizing intelligent technology, design interactive functions that can sense children's emotions and respond accordingly, increasing the emotional interactivity between children and intelligent products.

2.2.2 Influence of Family Environment on Children's Drawing

Children's drawing is an art form of free expression and creativity. Through drawing, children are able to express their inner feelings and thoughts and develop their own unique visual language. Drawing not only helps to cultivate children's aesthetic sense and artistic cultivation, but also promotes their creative thinking and problem-solving abilities. Therefore, providing a smart product suitable for children's drawing is of great educational and developmental importance.

2.3 Creating Space

The formation of young children's artistic qualities and the relationship between the family environment, a number of factors affect the family environment and thus also affect the physical and mental development of children. At present, for users, children are the top priority and parents are also the main buyers. The home is also the environment in which the child draws,

and any piece of furniture affects the child itself. Smart products should provide an open and creative drawing space to encourage children to express and explore freely. By providing a variety of drawing tools and materials, smart products can stimulate children's creativity and imagination. The education of preschool children lays the foundation for schooling and lifelong education. Among other things, art education can cultivate children's artistic sensibility, imagination, expressiveness and creativity, and promote the enhancement of their overall qualities. Can enable children to spontaneously engage in multidimensional learning practices [6], Enjoy the pleasure and fulfillment of self-expression and creativity.

2.4 User Requirements Study

2.4.1 User Profiling

In this paper, a "user profile" tool was used to identify child users and parent buyers. As the payers of children's toys, parents' opinions on the design of toys are very informative [7]. The study was conducted with Beibei, a four-year-old girl from Beijing, who is an only child at home and whose interest goals are to be active, to draw, and to explore.

Through the research parents found that Beibei's mother, Zhang Lei, lives in Beijing all year round, is a typical family of three, aged 34, and her interests lie in painting, fitness, traveling, and music.

2.4.2 User Journeys

Before designing the product, the first construction of the product's use scene is in the family, the use of the product in the family need to directly face the children and parents, in the process of the user's use of human interaction, human interaction with the product. Throughout the use of the link designers need to take into account the user's habitual behavior and mood changes, from which new ideas for designing products are found. As shown in Figure 1 below.

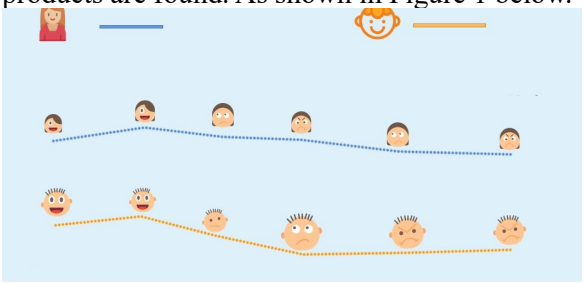

Figure 1. User Journey Maps

2.4.3 Product Service Systems

The children as well as the parents own the entire painting product and the producer of the product should provide the services related to painting. The children's painting product system requires a flowchart for the process of solving the design problem for both offline and online products. As shown in Figure 2 below.

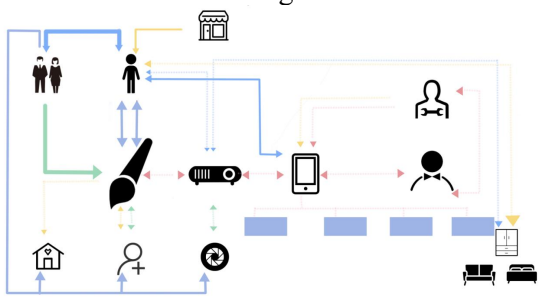

Figure 2. Children's Painting Product Service Diagram

Children use smart painting products to take out the brush to paint, in the middle of the product needs to build a virtual canvas, children through the virtual painting to complete the work. The product can be connected to the online APP before use, and after completing the work, it will be fed back to the online APP for easy sharing and continued use next time. As shown in Figure 3 below.

Figure 3. Flow Chart

3. Design Orientation and Conceptualization

3.1 Product Conceptualization Direction

3.1.1 Function and Structure

Unlike ordinary painting tools, as children distinguish themselves from the actual painting products on the market, designers design brushes, brushes should have the basic function of painting, with strokes, switching brushes, eliminating functions. Need to take into account the situation when children hold the device, and based on this to layout, children's fingers do not have the dexterity of adults, and there must be enough space around to avoid misuse click. In the design of the brush structure should follow the overall structure, for intelligent products and equipment using segmented design.

3.1.2 Material Processes and Colors

90% of water paints use water as a solvent to

satisfy younger children who put products in their mouths and "taste" them. Plastic is used in most children's products, and synthetic plastics and plastics are extremely common. Wood is the material mostly used for children's toys, and the safety and practicality of wood is very high. Color plays an indispensable role in children's growth, children have a strong perception of color, and their knowledge of the world is generally established from color [8]. Through the usual educational cognition of parents, they will be able to distinguish their favorite colors. In most cases, gender awareness is also developed in the process, e.g. boys like blue, green, yellow, black, red, etc. and girls like pink, yellow, white, purple, blue, etc.

3.2 Design Direction

Intelligent paintbrush to solve the problem of children aged 2 to 6 years old at home randomly painted around no longer bother the parents of the cleanliness of the home, to become a "good partner" on the road of children's growth. The use of holographic projection technology to build a virtual canvas, virtual painting in any location of the home. Boys blue submarine, girls pink garden shape, the material is environmentally friendly and safe resin and edible silicone children can be safer to use. Meet the family interaction, simple operation, easy to store. Intelligent drawing assistant with emotional design, designed to help children develop emotional expression and creativity. Emotion Recognition and Feedback: able to understand children's emotional state through image and sound recognition technology, and provide corresponding emotional feedback. When children express emotions such as joy, sadness, surprise, etc., corresponding affirmation and encouragement will be given to enhance children's emotional expression. Creative inspiration and guidance: Diverse drawing tools and materials are provided to stimulate children's creativity and imagination. Through intelligent algorithms and machine learning technology, it can provide personalized creative inspiration and guidance according to children's drawing styles and preferences. Emotional Interactive Interface: Adopts a cute and friendly interface design to establish an emotional connection with children. Children can feel the friendly and supportive emotional atmosphere, so that they can better engage in the drawing process.

4. Presentation and Explanation of the Final Program

4.1 Effective Diagram Display

Scene effect diagram of "Paint Around Intelligent Brush". As shown in Figure 4 below.

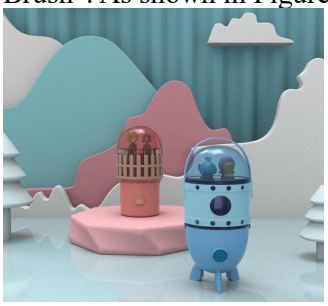

Figure 4. Rendering Diagram

The color scheme of "Doodle Doodle Smart Brush" is shown. As shown in Figure 5 below.

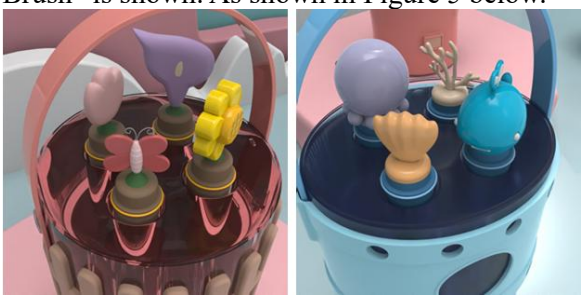

Figure 5. Rendering Diagram Internal Features

4.2 Program Description

Design description: This smart brush solves the problem of children from 2 to 6 years old at home, no longer bothering parents to paint around the house cleaning problems, and become a "good partner" on the road of children's growth. The use of holographic projection technology to build a virtual canvas, virtual painting in any location of the home. Boys blue submarine, girls pink garden shape, the material is environmentally friendly and safe resin and edible silicone children can be safer to use. Meet the family interaction, simple operation, easy to store. Because of the limitations of the family use of the environment, most of the equipment is placed on the table at home, so the size of the painting tools, buttons, function keys, the size of the brush should be based on the size of the child's hand to decide. Among them, the design of the physical model requires the child's fingers, the whole hand to interact with the smart brush, and the size of the buttons should be more than 1.25 CM, which depends on the size of the fingers and buttons in

ergonomics. The circle with the child's hand in holding the brush has to be more than 1 CM in diameter. As shown in Figure 6 below.

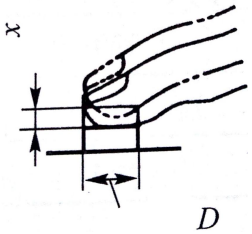

Figure 6. Button with Finger Size Drawing

Material is the basic elements of the form and structure of the composition of the product, children's products parents will pay extra attention to the safety of the choice of materials commonly used plastics, plastics are less dense, high strength, corrosion resistance, strong electrical insulation. Plastic is mainly ABS, PVC, etc., easy to process, easy to color, spray, low odor, strong corrosion resistance. The overall shape of this design is mainly made of plastic, and the smart brush part is made of ABS resin.

Color analysis painting products distinguish between male and female models, the boys' model is blue-based, the overall tone is light blue, in line with the submarine in the deep sea feeling, giving a clean and quiet psychological feeling, children use it will also help to focus attention. Girls models using pink as the main color, is a warm, sweet atmosphere, to attract the attention of girls in the lower age groups.

Technical analysis because the product needs to create a virtual canvas, so the holographic projection technology is used, holographic interactive projection system is based on the traditional projection equipment and functions, the intelligent paintbrush has a light-sensitive function. With infrared emission technology. According to the children's painting existing product research, young children use the product is the lack of high-tech intelligent technology, and ordinary traditional painting products painting space is small and there will be cleaning obstacles. Ordinary painting tools do not have intelligent technology can not reach, a single product has fewer functions.

5. Design Summary

This thesis investigates the affective design of children's drawing smart products, and by combining artificial intelligence technology and the principles of affective design, develops a smart drawing product that can interact with children, understand and respond to their emotional needs. The results of the study show that affective design is of great significance to the development and application of children's drawing smart products, and has a positive impact on children's emotional development and creative thinking. Future research can further explore in depth the emotional design approach of children's drawing smart products and expand their potential for application in the field of children's education and art.

Through the analysis and study of the topic, children's painting researched the behavior and psychological development of preschool children in the family for a detailed understanding of children's painting itself is a way to cultivate children's interests and can liberate children's nature. Emancipating children's nature reduces the physical and mental constraints on them, and helps to increase their imaginative and creative abilities. Parents also play an important role in guiding their children's early education, which can have a profound effect on their future development.

Through the system constructed with the online painting APP, complete the virtual painting, using the research on the preliminary for the children's painting environment designers in the design of the functionality and the overall style of the product. Provide new ideas and thoughts for the painting products afterward.

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