Discussion on the Principles of Animation Design of Intelligent Children's Products Based on User's Demand*

Kaiqing Chen
School of Design Art
Xiamen University of Technology
Xiamen, China 361000

Abstract—**Against the background of the development of new media and smart technology, questionnaires were used to investigate the users of intelligent children's products to collect data and analyze the components and characteristics of user needs of intelligent children's products. The questionnaire consists of three aspects: family education concept, children's product content and operation experience. It further uses the basic principles of animation design and children's psychological cognition theory to study the design method of animation design applied to intelligent children's products based on users' needs aiming to find a balance which needs to be struck between enhancing the innovation of the design and adapting to the needs of the users and guiding the design practice.**

Keywords—animation design; intelligent children's products; users' needs; children's psychological cognition

I. INTRODUCTION

With the further release of the demographic dividend, the Chinese consumer market of Chinese children will maintain high growth in the next decade. The users of children's products are children and parents, and the function is to help children grow up. The new generation of parents who have grown up with the Internet are more open to the Internet, have more channels to acquire parenting knowledge and more diverse educational concepts. They are also good at using smart products. In addition to traditional books, smartphones, tablets and smart TVs have become their main parenting channels and carriers, and the content requirements are more critical. For example, the parent-child activities of the home users are centered on the living room. With the development of smart TVs, the use of on-demand functions allows users to independently and directly select the content to be viewed. The user's viewing preferences are more accurate, which puts new demands on the content design of the product to meet the multi-sensory needs of visual hearing and touch and to be fun, nice, and attractive. This change requires animation design to face the rapid development of new media and smart technology, and further development in

multiple dimensions.

The famous Swiss psychologist Jean Piaget studied children's language and thinking: the cognitive process of children is actually the psychological process of perceiving meaning from symbols.[1] The shape in anime design is to give shape and human or animal characteristics through deformation, exaggeration or simplification, such as form and posture expression, so that children can understand the relevant emotional experience from the design and thus form resonance. From the perspective of children's psychological cognition, animation design is the most suitable type of design for children's products. In recent years, research on the relationship between animation design and children's products at home and abroad has focused on modeling and color research. Luo Bijuan (2005) pointed out in the "Humanized Design of Children's Products" that children's products attract children's attention with bright colors and exaggerated shapes, so that they can enjoy spiritual pleasure and meet their psychological needs. Peng Qiong (2013) "Mobile Digital Early Learning Software Interaction Design Based on Children's Cognitive Style" concludes that the cognitive style of preschool children is often graphic. Therefore, the interactive design of early childhood education software products should focus on the design of specific graphics, pay attention to the interaction of children and products, and provide effective and encouraging information in a timely manner. Hou Yutong (2017) "Children's Digital Picture Book Based on Color Cognitive Psychology" starts from children's sensitive color perception characteristics and sums up that color can not only affect children's emotions but also trigger children's imagination to guide color design. In Fang Hao (2017) "Preference in the Vrtual World: APP Cartoon Aesthetics from the Perspective of Preschool Children", the study shows that preschool children prefer animal images in the performance of cartoon characters, and prefer exaggeration and anthropomorphism in performance style. This provides a quantitative theoretical basis for the cartoon image design practice of children's products.

[1] Wang Jianhong, Research Methods of Preschool Children's Development and Education [M], People's Education Press, 991, 33-36.

Based on the above research results, the traditional animation design research scope mainly discusses the creator's psychological analysis, styling and color design principles, cultural elements, etc., but the combination of animation design and children's products is not simply to put the cartoon image on the product, nor is it simply combined with product features, shapes, etc. In the new era, animation design should pay attention to the way of communication between media and smart technology, tap the hidden needs of users, and consider the design method from the perspective of user needs.

II. SURVEY ON USERS' DEMAND FOR SMART CHILDREN'S PRODUCTS

For the development of intelligent children's products, it is necessary to fully understand the users and their needs before design, to guide the design direction with user needs, and to support the entire design process. Researchers need to understand the characteristics and capabilities of the user, the goals that the user wants to achieve and how they are implemented, and whether the design can make its goals more efficient.

This study uses online questionnaires to collect users' demand data. The content of the questionnaire is mainly divided into two parts: content requirements and operational experience of intelligent children's products. The survey was mainly for parents of children aged 2-6. Among them, 73% had a bachelor's degree, 13% had a master's degree or above, and 4% had a high school and college degree. The research questionnaire shows that users with higher education are better at using Internet and technology products: 76% choose tablet, followed by mobile phone (57%). In terms of educational philosophy, the new generation of parents not only pays attention to their children's academic performance, but also pays attention to children's character development, moral cultivation and communication methods. Paying more attention to children's uniqueness and individuality has become a new educational philosophy for parents.

The new generation of parents is more open to Internet technology products. The survey shows that in the content and experience of children's products for children's products, healthy content ranked the first, which can be in line with the child's physical and mental development; secondly is the products that require education, children's enjoyment, and interactivity; the ease of operation is ranked third, requiring full consideration of the ease of use of the design, the use of the operation at a glance, the establishment of natural matching, being easy for users to identify and understand; in addition, it also requires security and bilingual function.

Users of smart children's products are children and parents. Children are the main body of learning. First, it must be considered that what ways can attract children to use products. Parents are paid for, and in most cases parents need to know how to use them to support family education.

III. ANIMATION DESIGN PRINCIPLES TO MEET USERS' NEEDS

Based on the needs of the users listed above, the three design principles of fun, interactive and emotional design of animation design in children's smart products are summarized.

A. Enjoyment as Design Principles

The so-called taste refers to "the factors that can cause people to feel certain emotions, or make people feel happy, make people feel interesting, or can infect people, impress people, educate people, and catch users' attention." Enjoyment, it will make people feel fresh, amazed, ingenious and pleasant, and have a distinct personality. [2]

American psychologist Reber believes that children's cognitive process is an implicit learning process. It is "unconsciously acquiring a complex knowledge process about the stimulating environment, that is, an unconscious learning process". Among them, "interest" plays a leading role, which is the main driving force for children, especially preschool children, and for the unconscious learning process.

Therefore, the study of animation design in the development and application of intelligent children's products must first study how to attract children's interest, achieve enjoyment, meet the user's cognitive needs, and increase user's stickiness on this basis. The design of the smart water cup Gululu ("Fig. 1") provides a good example of research. The smart water cup starts from the child's psychology and combines the animation design with the drinking water function, thus forming a habit development solution for children to take the initiative to drink water: in addition to connecting APP data analysis can detect the condition on child's drinking water, the most valuable and the innovated part is the dynamic cartoon design of the "water elf" on the bottle. "Water elf" is three cartoon characters full of children's fun. It interacts with children's use through the screen and mobile APP on the bottle. When the user drinks water or touches the water cup, the water elf will react accordingly. The images are cute. At the same time, after completing the task of drinking water, it will promote the development of the water elf image, gain interesting rewards, and effectively promote the development of children's good habits.

---

[2] Song Zhao, Study on the Interesting Design of Preschool Children's Picture Book under the Perspective of Cognitive Psychology [J] China Publishing Journal, 2016.9.

Fig. 1. Gululu Smart Water Cup.

The image and animation of the water elves are designed by professional animation studios, and set a storyline full of love, and made an animated film. The cartoon image designed for children allows children to actively integrate into the use of smart water glasses, while the animated films full of whimsy become a bridge to encourage children's good habits. Its design is shown in "Fig. 2".

Fig. 2. Gululu smart water cup design.

B. Interactive Design Principle

Interactive design[3] refers to the use of different feedback mechanisms, such as the visual perception of the virtual buttons on the touch screen, the sound feedback through the buttons, the perception through the hearing, the vibration through the vibration of the device, and so on.

Every child has creativity, and a good child design is to involve children in the process of communicating with the design, which makes children more interested in the process of creation. The interactive design in the intelligent product

---

[3] Chen K H, Hwang K L. Multi-Sensory Emotion Experience: Evaluation on the Interaction Design for Handheld Devices[C]/ International Conference on Orange Technologies, IEEE, 2013.

makes the user's use process amazed and feedback. The interactive design feedback can stimulate children's exploration and make children actively participate in the fun of the product.

In the dynamic picture book presented by the tablet, the animation design can help preschool children understand, participate in the story and content, achieve more consistent information processing and understanding, and form a deeper sense of participation and achievement in the reading of the picture book so that they can understand the enjoyment. Therefore, in the design, the small animation effect with simple shape causes the child's strong interest. The touch experience through the touch screen will bring about the effects of vibration, vocalization, alignment and gravity landing, such as clicking on the hand of the cartoon character, the character will be beckoning, and send a good voice; while clicking on the house, the house will shake; if clicking on the small animals will run, etc. These make children can acquire knowledge while learning and entertaining. The game forms of drag-and-drop, jigsaw, graffiti, and elimination are designed in the story of the picture book, allowing children to participate in the creation of the picture content of the picture book, and also to strengthen the memory in the "unconscious". In order to encourage children to explore, they will respond interactively in the design of the game. For example, some flower effects or applause will be set in the game level. As the child's operation makes the story of the picture book step by step, actively explore the knowledge, thereby improving the learning ability and developing the imagination.

The convergence of animation design and augmented reality (AR) technology provides a new perspective for the development of intelligent children's product interactivity. In the traditional children's education products, it can only rely on pictures and words to understand and learn. The text is abstract, the animated images can create images, and the augmented reality (AR) is to strengthen the experience based on the real environment. Enhanced virtual reality 3D animations make objects more vivid and complete. This rich and flexible experience combines text, images and dynamic media to give kids a deeper understanding to acquire knowledge. For example, the study of geographic knowledge is inseparable from the aid of the globe, but the traditional globe has only national borders and latitude and longitude lines, and it is difficult to contain a large amount of geographical knowledge. The AR globe allows children to see a real earth through augmented reality, tracking technology and 3D rendering. Through animation design, it can distinguish different modes, such as national mode, architectural mode, animal mode, etc., and then use detailed 3D animation model to let users understand the iconic information of each country on the earth and the representative animals and plants of each continent etc. At present, an AR globe product that has won the Italian Design Award design award is designed and produced a series of animated stories that attract a large number of users, such as a story about the Lunar New Year and a girl's trip to China, which are the highlights different from similar products. Colorful, cartoon, and child-friendly AR globes can firmly

attract children's interest and attention, break through the limitations of traditional educational products, and let children actively learn and actively explore and think.

IV. EMOTIONAL DESIGN PRINCIPLES

The study of emotional design [4] has a long history, discussing people's experiences with instinct, behavior, and reflective elements and emphasizing the need to incorporate emotions into design considerations. As Donald Norman pointed out in "Emotional Design" that: Emotional design can stimulate different types of emotions, giving consumers a sense of novelty while making the design more in line with users' needs. [5] Emotional experience refers to the proprioception and the psychological associations that people get when they face new things through touch, sight, hearing and other physical senses. The emotional experience in game design pays more attention to the unconscious judgment of the brain. Different emotional values will trigger different emotional and physiological responses from gamers. Users want smart children's products to be able to attract children, but also to meet children's expectations and emotional needs. The essence of animation design is to let the audience meet in fantasy and get moved in the imagination. Unlike other products, animation and its derivatives do not satisfy consumers' demand for functional use of products. They satisfy the psychological needs of users' free imagination and give consumers emotional satisfaction experience. [6] Therefore, affection is also an important principle in the development and design of intelligent children's products.

The combination of animation design and AR technology can display the classic anime character image more vividly through AR technology, and can be in close contact with children to meet the emotional and psychological needs of children. Children's understanding of things is straightforward, and their emotional changes are more susceptible to the external environment. The understanding of things is based on their own emotions, so they are more interested in products that are full of emotions. The appeal of the anime image is mainly reflected in two functions: one is to create a partner to accompany the child's growth, and the other is to model the growth and guide the child to let the children see the same animated characters as they are, so that the children feel that they are no longer alone and grow up calmly. Therefore, the integration of animation design into the development of children's products will be more conducive to the child's spontaneous identity with a strong stickiness.

Under the trend of information mobilization, intelligent children's products will find more and more products launched in the form of mobile platforms (such as tablets and smart phones), characterizing by interesting interaction and strong socialization of products. Among them, the mobile web page based on HTML5 technology (hereinafter referred to as H5 page) is in line with the above characteristics, and the use of social circle friend relationships has triggered large-scale sharing behavior on the social platform. Unlike traditional mobile web pages, the most intuitive experience of H5 pages is their rich animation. Feedback animations can appear when a user clicks on an element on the page, slides, or even shakes the phone. H5 animations for children's product types are often used to tell a story, similar to animation in cartoons. For example, in the design of the H5 launched by the parent-child portal, in order to make the experience participatory, based on the photos displayed by each family, a personalized family cartoon image will be created, and these cartoon images will run through the entire H5 continuous picture to let users create their own travel diaries, and use AR technology to make cartoon images appear in tourist attractions in a three-dimensional way, so that children can more naturally integrate into the plot and increase product stickiness. This type of animation design and animation of traditional cartoons follow some common design principles, such as highlighting the main characters and conveying the sense of space through parallax. But in the design process, it should also be noted that, unlike the cartoon, the animation in H5 is not automatically played in chronological order, but triggered by the user.

V. CONCLUSION

Comprehensive and careful considerations of the needs of parents and children's habits need to be paid attention on. It is also important to meet the needs of users through technical means to let children complete their own learning through exploration and interest. This is the starting point for good communication with children. It is the integration of animation design that makes the use of smart children's products simple, fun and more viscous. The anthropomorphic image and symbolic psychological cognition of animation design are important factors suitable for children's products, but animation design can not only consider modeling and color. Under the trend of cross-border integration, animation design must be based on users' needs and enhance the emotional attributes and content enjoyment of products. . The creative thinking, content and technology of animation have a broad application space in intelligent children's products. For the purpose of function, emotion is the foundation, animation is the display carrier, and intelligent technology is the technology to realize the design of high-quality intelligent children's products. The innovative application research on animation design is a broader and deeper animation vision and perspective than the traditional animation industry.

---

[4] Donald Author Norman, Design Psychology: Emotional Design [M] CITIC Press Goup, 2012.

[5] Xue Jiao, Research on Somatosensory Game Operation Interface Based on Emotional Experience Theory [D] Shanghai: East China University of Science and Technology, 2015.

[6] Huang Shuzhong, Animation Psychology Research and its Application in Industrialized Cartoon Development [J] Art & Design, 2008, 05, 15.

REFERENCES

[1] Wang Jianhong, Research Methods of Preschool Children's Development and Education [M] People's Education Press, 991, 33-36. (in Chinese)

[2] Song Zhao, Study on the Interesting Design of Preschool Children's Picture Book under the Perspective of Cognitive Psychology [J] China Publishing Journal, 2016.9. (in Chinese)

[3] Chen K H, Hwang K L. Multi-Sensory Emotion Experience: Evaluation on the Interaction Design for Handheld Devices[C]// International Conference on Orange Technologies, IEEE, 2013.

[4] Donald Author Norman, Design Psychology: Emotional Design [M] CITIC Press Goup, 2012. (in Chinese)

[5] Xue Jiao, Research on Somatosensory Game Operation Interface Based on Emotional Experience Theory [D] Shanghai: East China University of Science and Technology, 2015. (in Chinese)

[6] Huang Shuzhong, Animation Psychology Research and its Application in Industrialized Cartoon Development [J] Art & Design, 2008. (in Chinese)