Research on Cultural and Creative Product Design System
Based on 3DP Technology

Chongli Zhao1,*

1College of Art Design, Shandong Women’s University

*Corresponding author email: sxdmz@163.com

Abstract. With the development of the times, the progress of society, the continuous improvement of human science and technology and cultural level, more and more high-tech science and technology are constantly applied in daily life, 3DP technology as a member of many high-tech is gradually accepted by people. In this era of rapid development, the research and development of cultural and creative product design system cannot do without the help of these high-tech technologies. In order to better meet the requirements of the new era for cultural and creative product design system, this paper proposes a method to integrate 3DP technology with the research of cultural and creative product design system. Based on the analysis of the current situation of the research on the design system of cultural and creative products, the rapid prototyping technology of 3DP technology is fully used to help the designers to carry out innovative research on the design system of cultural and creative products better combined with the current new media, so as to formulate a set of development scheme of the most suitable cultural and creative product design system in the new era. It is found that the method proposed in this paper is of great significance to promote the research and development of cultural and creative product design system.

Keywords: Science and Technology Culture, 3DP Technology, Cultural and Creative Products, Rapid Prototyping

1. Introduction

Today, the retail industry of Internet cultural and creative products has great potential and opportunities. The design of cultural creative products[1-2] takes tangible culture as a core element and link of product development and operation. Its importance comes from the correct understanding and interpretation of the connotation of tangible cultural products by product designers. Product designers present "tangible culture and fun" perfectly in the form of materialization by using various creative means such as reorganization, grafting, remodeling and implantation. For most entrepreneurs and
product designers, because of its cost and time, developing new products and updating prototypes often directly make a great design idea impossible to realize. 3DP technology\cite{3-5} is used for design thinking, and its rapid prototyping function has unique advantages in integrating cultural and creative design thinking, so that designers can quickly and efficiently realize their own ideas.

With the progress and development of manufacturing industry\cite{6-8}, the traditional processing and manufacturing technology has been unable to meet the needs of modern manufacturing industry. 3D printing (3DP) technology has been paid more and more attention by the world's manufacturing industry because of its short production cycle and high efficiency. The products produced by 3DP process have good mechanical properties and high density. At present, these products have been used in medical, aerospace, automotive and other fields. At present, the research on 3DP technology at home and abroad mainly focuses on three types: cladding, selective laser melting and selective laser sintering. The quality of forming matrix is one of the key problems in the development of three forming technologies, which directly determines the reliability and service life of parts.

This paper studies the research method of cultural and creative product design system based on 3DP technology. Due to the rapid development of the new era, more and more high-tech\cite{9,10} is constantly applied in people's daily production and life. In order to meet the challenges brought by the new era, all walks of life must reform and innovate with the help of science and technology. In order to better meet the requirements of the new era for cultural and creative product design system, this paper proposes a method of integrating 3DP technology with the research of cultural and creative product design system. Based on the analysis of the current situation of the research on the design system of cultural and creative products, the rapid prototyping technology of 3DP technology is fully used to help designers to carry out innovative research on the design system of cultural and creative products better combined with the current new media, so as to formulate a set of development plan for the most suitable cultural and creative product design system in the new era. It is found that the method proposed in this paper is of great significance to promote the research and development of cultural and creative product design system.

2. Research Method of Cultural and Creative Product Design System Based on 3DP Technology

2.1. 3DP Technology

Designers use 3DP and 3D modeling technology, integrate design thinking to build reality, and creatively and rationally generate solutions through thinking about situation problems. Since each product is developed through an iterative design process of prototype design, manufacturing and pregnancy, by using 3DP technology, designers can fully evaluate the feasibility of the product, explore new possibilities, test the form and function of the product, and compare it with the last iteration of deviation and evolution degree. Through this way of thinking, designers can better improve their own design process, promote innovation to a higher level, create new possibilities, let people experience the function of products or space, make them appear in the real world in a specific form, and become a new, purposeful and meaningful supplement.
2.2. Research on Cultural and Creative Product Design System

Cultural and creative products refer to any combination of cultural products or economic products produced by cultural and creative industries, including hardware carriers of products and creative and service contents of other cultural products. Among them, the contents of cultural and economic creative products must be the technical core and value of all cultural and economic creative products, but the contents of cultural and economic creative products must take cultural products and services as their carriers, and they must be interdependent. Therefore, the creative content and core value attributes of cultural products mainly include the attributes of creativity and service value of all cultural products and the attributes of economic benefit value of cultural products. Cultural and creative products have the common characteristics of general products, but their particularity is that the core part of culture and creative content is the value of cultural and creative products, which indirectly affects the added value of products and becomes the core competitiveness of enterprises.

3. Experimental Correlation Analysis

3.1. Experimental Background

Design style can well reflect the temperament characteristics of cultural and creative products and bring rich artistic beauty to users. For example, modern fashion style. Simple and atmospheric style. Traditional craft and elegant craft. The trend of the cultural characteristics of University user groups in product style and aesthetic feeling, the style beauty of university cultural and creative products has a relatively fixed audience group.

3.2. Experimental Design

University culture not only determines the content of formal semantics carried by creative products, but also has an important impact on the style of design. Design often shows different styles in different cultural forms. For example, the simple and natural design style of northern Europe and the gorgeous and romantic style of France. Therefore, cultural characteristics also have an impact on university design. Through investigation, we can get various styles of cultural and creative products and analyze them. The results are shown in Table 1:
Table 1. Style analysis of cultural and creative products in Colleges and Universities

| style               | characteristic                                             | audience       |
|---------------------|------------------------------------------------------------|----------------|
| Retro               | Simple, elegant and gorgeous                              | widely         |
| Modern simplicity   | Concise, simple, clear and meticulous                     | widely         |
| Cartoon             | Through generalization, exaggeration, deformation to shape the product image | Student groups |
| popular             | Emerging in a period of time and sought after by consumers | widely         |
| business affairs    | Steady, serious, elegant and exquisite                    | Business occasions |

4. Discussion

4.1. Analysis of Research Status of Cultural and Creative Product Design System Based on 3DP Technology

At present, the design of cultural and creative products in domestic colleges and universities generally points to temporary and functional, which leads to the lack of cultural connotation and the neglect of emotional experience. The same development, the development trend of comprehensive universities, the establishment of new and old campuses, the building accumulation of lifeless, the lack of
personality of public landscape decoration, which destroyed the inheritance and continuation of the whole school culture, made the spirit of colleges and universities disappear, showing the situation of "one thousand schools are the same". In the cultural construction of colleges and universities, students' rich extracurricular life is ignored; campus culture construction fails to fully understand the needs of campus groups; in campus group life, students generally lack of interaction with campus group activities, resulting in the lack of emotional exchange and internal connection between the existing campus cultural and creative products and the group of teachers and students, and the degree of product attention is very low. In order to fully understand the current situation of campus cultural and creative products, this paper conducts a field survey of college teachers and students in the form of questionnaire, the survey results are shown in Figure 1:

![Figure 1. Demand analysis of campus cultural and creative products](image)

As shown in Figure 1, 86.2% of them are used for commemorative collection, 35.4% for giving to relatives and friends, and 31.6% for self-use. Through the analysis of people's purchase intention, the design direction and development focus of cultural and creative products are determined. The function of commemorative collection should highlight the commemorative value, its own use should pay attention to the use value, and the presentation of relatives and friends should pay attention to product features, such as local specialties. In the category demand of campus cultural and creative products, commemorative collection category is the largest, followed by stationery and books, special products, daily necessities and clothing. The questionnaire survey shows that the awareness of campus cultural and creative products is very low. It can be seen that the marketing of campus cultural and creative products is not enough, even almost blank, and needs to continue to develop and promote.

College Students' consumption psychology is not mature and their consumption behavior is active, which makes them prone to impulse consumption out of plan. Buying behavior is direct and imitative. Immediacy refers to simple and fast small products, instant understanding, and quick purchase. The novelty of this product is that its appeal to users is random. Imitation refers to that users are influenced by the culture of the group they belong to, pursue fashion and trend, and make imitative purchase in order to obtain a sense of cultural identity. Based on the investigation and analysis of the time period
and frequency of College Students' purchase of cultural and creative products, the survey results are shown in Figure 2:

![Figure 2. Purchase frequency and time period](image)

As shown in Figure 2, the high frequency stage of College Students' purchasing cultural and creative products in Colleges and universities mainly occurs in the two stages of freshmen’s enrollment and senior's graduation. When freshmen just enter the University, they pay more attention to the university culture and the additional cultural significance of the products when they choose products. Senior graduation is an important time node in students' life. They will choose products with university culture and emotional significance as souvenirs.

University cultural creative products should not only have a good functional experience, but also put forward higher requirements for the coordination of function and cultural connotation. At present, university cultural and creative products only focus on function or decoration, which cannot effectively coordinate the decoration, function and cultural connotation of products. Therefore, it is of great significance for the development of cultural and creative products in Colleges and universities to analyze the innovation principles of cultural and creative products from three aspects of emotion, coordinate the design of aesthetic feeling, function and emotion, and establish design strategies and performance methods.

4.2. Suggestions on Research and Development of Cultural and Creative Product Design System Based on 3DP Technology

In the 21st century, the whole society ushered in the era of experience economy. People's needs have risen from basic material needs to emotional and spiritual needs. Therefore, improving the cultural connotation and experience value behind the products has become an important way to enhance the core competitiveness and cultural heritage of products. Experience economy stimulates the status of experience in cultural and creative industries, and creative design of cultural products based on
experience will usher in new opportunities.

The experience of human and cultural creative product noumenon is actually the relationship between human (user) and cultural creative product's form, function, color, material, texture and other elements, so as to produce rich experience. Shape and color will give people the first sense of visual impact, function in the process of using products, it will give people more operation and visual experience, material and texture and other elements will directly give users more sense of touch and experience. These functions and elements form a variety of sensory tactile and experience, combined with the rich psychological and life culture experience of users and different traditional life culture expression ways, will form a profound perception of psychology and life culture for users. The primary premise of the user's cultural value orientation is a deep understanding of culture and content, which is related to the essential source of Chinese traditional culture, its formation and the natural and modern social background of its development. The importance of the orientation of cultural and creative products determines the traditional culture that should be inherited and expressed in the development and design of cultural and creative carrier products. It is the fundamental and starting point for the development and design of creative carrier products of traditional culture in China. What is the carrier of culture, namely cultural goods, is a form of cultural goods that integrates the abstract concept of traditional cultural and creative products into specific visual images, including cultural collection of gifts, cultural and creative items, toys, etc. What is the creative carrier of culture, that is, the consumer group of products is a market consumer group. Different market consumers and groups have different understanding of the same kind of cultural and creative products, so they have different preferences for cultural consumption.

In the era of 5g, integrating cloud computing, 3D printing technology, intelligent manufacturing and other high-tech 3D printing cloud service systems, a 3D printing personalized customization service mode of "3D printing + consumer service + transaction portal" is constructed. The design concept of "demand satisfaction, creative personalized design customization, printing product diversification and consumption" is adopted, We can provide customized design services for consumer groups, creative designers, equipment suppliers and system builders, and enhance participation and experience of the whole process of cultural and creative product design and 3D printing technology, forming a new business model composed of cultural and creative product design groups, consumer groups, 3D printing service providers and system platform builders, For the consumer goods market and cultural and creative industries of personal cultural and creative products, we provide personalized customization and consumption services for 3D printing products. The generation of 3D printing personalized customization cloud service system is aimed at cultural and creative products, innovative design education and other fields and industries, to meet the personalized creative products online publishing, design resource sharing, personalized customization services, online printing manufacturing services, 3D printing and creative products development and sales services.

5. Conclusions

This paper introduces the research of cultural and creative product design system based on 3DP technology. The rapid development of the current era has brought a lot of impact on all walks of life in
China. In order to meet the new requirements of cultural and creative product design system in the new era, this paper puts forward a method of integrating 3DP technology with the research of cultural and creative product design system. This paper analyzes and prospects the research status of cultural and creative product design system, makes full use of rapid prototyping technology of 3DP technology, so as to help designers better combine the current new media to carry out innovative research on the design system of cultural and creative products, so as to formulate a set of the most suitable development scheme of cultural and creative product design system in the new era. It is found that the method proposed in this paper is of great significance to promote the research and development of cultural and creative product design system.

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