

Research on the Decorative Art Expression of Walls in Architectural Design

Xiuyun Li^{1,a,*}

¹School of Art, Graduate University of Mongolia, Ulaanbaatar, 999097, Mongolia

^asueone921@163.com

*Corresponding author

Abstract: As a supporting surface and interface for separating spaces in buildings, wall is one of the eye-catching places, and its decorative effects directly affect the atmosphere of the space, thus receiving increasing attention from architectural designers. Based on the design principles of wall decoration, with the survey results of satisfaction with the original wall painting by experts and scholars in the art field and residents of M village as supporting conditions, the painting art wall was designed and optimized in combination with the artistic and functional aspects of architectural design, which aims at studying the connotation of the artistic expression of wall decoration in architectural design. Through the analysis of the case study on the optimization design of wall painting in M Village, the results showed that 83.5% of villagers believe that wall art painting has a highly decorative effect. Architectural decorative wall painting design is conducive to expressing emotions, showcasing personalized art, and disseminating cultural ideas, thereby stimulating villagers' pursuit of artistic beauty and enhancing the taste of rural life.

Keywords: Wall Decoration, Wall Painting, Artistic Expression

1. Introduction

In modern environmental art design, landscape design and architectural design, the wall plays an indispensable and important role. It is not only a barrier that people rely on in their daily lives, but also a psychological shelter. The design of walls can therefore also have a direct impact on and reflect the quality of people's lives [1-2]. With the improvement of people's artistic cultivation, wall art, as a popular new type of decorative design, has been sought after by young people, which can better reflect the aesthetic orientation of contemporary people. Wall painting is a new means of spatial decoration expression method, a new trend that has emerged after the evolution of the ancient art of fresco and graffiti [3]. The bold and diverse colors used in wall painting stimulate people's aesthetic emotions and meet the personalized decoration needs of different groups. At the same time, wall painting is creative in terms of composition, modeling and material application, especially the "skin care" function of wall painting, which cannot be ignored, as it integrates with the living environment and gives people pleasure and spiritual strength.

As an ancient and young art category, wall decoration has been given new connotations in the new era. Wall decoration is no longer a tool for spreading religion, but an art category that creates functional and spiritual spaces for human beautification of the environment. Nardo M conducted a non-destructive analysis of the murals inside St. Mary's Cathedral using a handheld spectrometer (mainly XRF (X Ray Fluorescence) and Raman spectroscopy), and studied the physical and chemical properties of the pigments used. Through on-site measurements, it was found that the red color is hematite, while the blue color is lapis lazuli. At the same time, relevant information on black pigments, the processes used, and the preservation status were also obtained, which deepened our understanding of murals [4]. Using leaves to create murals is an experiment in using leaf fragments to create interior wall decorations. Suryandari P studied the training of teachers and students on green buildings in eight architectural research projects in Jakarta. The training method is to use drawing paper, glue, watercolor pens, and scissors as tools to directly demonstrate and draw on the construction site. The final result is to generate different images on two or three dimensions. Subsequently, leaves from 8 works would be exhibited [5]. With the continuous emergence of new materials and functions, the application prospects of this theory would be even broader, and further exploration is needed.

So far, there is not much theoretical research on wall decoration, especially on the decorative

patterns of wall decoration. Therefore, the research direction has a certain degree of innovation. The development of wall decoration in many cities is still in its early stages, so it is very meaningful to explore the application of wall decoration in contemporary life from this new perspective.

2. Design Principles and Artistic Forms of Wall Decoration

2.1. Design Principles in Wall Decoration

2.1.1. Adherence to the Principles of Humanity

Space carries the emotions of people and nature, and is a place where people interact with each other. When designing and planning, one should consider people's practical needs and pay attention to their psychological needs, in order to achieve harmonious unity. Especially, the proportion of walls in the space is large, so good decoration of walls can make people feel comfortable and beautiful.

2.1.2. Design Principles of Formal Beauty

The basic goal of architectural design is to create a comfortable, reasonable, and emotional living environment. Therefore, the formal beauty in architecture should also follow the principle of "people-oriented". Formal beauty is an emotion and cognition formed through the observation, creation, and refinement of the images of beauty in nature over the past few thousand years. It has independent aesthetic value. The laws of form and beauty are universal laws of objective things, mainly: change and unification, symmetry and balance, proportion and size, rhythm and cadence. In the design of walls, if the principle of formal beauty is followed, beautiful lines, diverse shapes, and harmonious colors can be created, making the spatial structure rich and colorful. Following the principle of formal beauty is also consistent with the cultural psychology of the nation's pursuit of completeness and the longing for happiness and fulfillment [6-7].

2.1.3. Design Principles that Combine Tradition and Fashion

In architectural design, the decorative art expression of walls should not only take into account the cultural characteristics of the nation, but also reflect the distinct characteristics of the times. Therefore, both patterns and colors need to be integrated into the decorative art of the wall, while also emphasizing the aesthetics of the times and the traditions of the nation [8-9]. Only by preserving the art and culture of the nation would it be able to stand among the arts of the world. To reflect the trends and culture of the times, the design of the wall must be boldly innovative in form, pursuing diversity and individuality in order to meet people's psychological needs. Therefore, for wall design, paying attention to trends has become very important [10-11].

2.2. Form and Function of Wall Painting

2.2.1. Form of Wall Painting

Wall painting takes the walls of buildings as a carrier and is no longer limited to the frame. With its unique creative ideas, it creates a colorful world with artistic characteristics on the walls. Of course, traditional decorative painting can also have a certain improvement effect, but it is limited by the size of the picture frame, which effect on the environment is not as good as wall painting. There are various styles of wall painting, which are closely related to the background and regional culture of the time. The various forms of wall painting can meet the special social and cultural attributes and aesthetic requirements, but also show the sense of the times and adapt to the urban evolution of the time [12-13]. In the modern decoration, the paintings on the wall also show their different styles according to the different partitions of the internal space. For example, the living room is the activity space with the most people in the family environment, so the selection of wall coatings that match it requires stability and generosity; the cafeteria is a place where people choose to eat. When choosing wall colors, the main goal should be to create a comfortable and relaxed dining environment as much as possible. In a small space like a vestibule, the artwork on the selected wall should have the finishing touch effect and make people stand out [14-15].

2.2.2. Function of Wall Painting

(1) Decorative function

The main function of wall painting is to serve as decoration. The basic feature of wall painting is the flat form of the plane. Designers use the unique expression techniques of decorative painting to

coordinate the surrounding environment of the space; thereby the entire space presents a beautiful feeling.

(2) Practical functions

At present, most houses are mainly based on simplicity. How to make the existing small spaces appear more spacious and bright requires the use of paint on the walls to increase the ductility of the space. That is to say, based on two planes, a three-dimensional interpretation of wall painting is carried out. However, the realistic scenario and three-dimensional space of wall painting is actually a layered planning of the existing space according to local conditions, with illusory processing of images and creative expression of vivid images, thus resulting in spatial extensibility and visual illusion [16-17]. Such an expression has a visual impact on the expansion of space, regulating people's sense of immediacy and psychological expectations, which enhancing the cultural taste in a specific environment.

(3) Guidance function

Wall painting can meet people's spiritual pursuit of beauty, rather than just beautifying and extending the space [18-19]. The architectural decoration environment provides a display interface for the walls and can reflect their own value. Wall painting can also compensate for the shortcomings of existing spaces and aesthetic deficiencies of people to a certain extent, forming a complementary relationship between the two and meeting the artistic needs of residents [20].

3. Investigation of Architectural Design Projects

3.1. Background of Architectural Design Project

The overall area of M Village is 6 square kilometers, with 2000 acres of paddy fields, 1214 acres of mulberry fields, and 560 acres of fish ponds. With a total population of 4,082, the village is well served by traffic, abundant in resources and has 500 square meters of collective village office. The leading industries are fish farming, shrimp farming, and sericulture. In terms of ecology, the theme is the tens of thousands of egrets unique to M Village, highlighting its high-quality ecological environment. Additionally, in combination with ecological extension, especially the village appearance, implementing popular science education on garbage classification in rural areas, which improved the concept of environmental protection?

3.2. Market Research

For the application research of wall painting in M Village before and after optimization design, a market survey needs to be conducted. The obtained data and analysis results can provide an effective theoretical basis for this study, and make a prediction of the future development trend and characteristics of wall painting.

3.2.1. Delphi Method

The investigation of wall art was conducted mainly by experts and scholars in the art field, with full and associate professors as the main research subjects. The research was conducted using the Delphi method mainly through a combination of questionnaires and telephone or email consultation, and the total number of valid questionnaires returned by the survey was 17.

Research purpose: To understand the basic connotation of wall painting, and based on expert suggestions, summarize and correct the unreasonable points in other survey questionnaires, which in order to make future survey work more detailed, reasonable, standardized, and effective.

3.2.2. Sample Statistical Method

This study focused on the villagers aged 20-40 in M Village, who were the general audience. This survey adopted a questionnaire approach. During the survey 100 survey questionnaires were distributed to the audience, of which 85 were valid. SPSS 22.0 was used for statistical analysis of the data and t-test was performed:

$$t = \frac{\bar{X} - \mu}{\frac{\sigma X}{\sqrt{n}}} \tag{1}$$

$$t = \frac{\bar{x} - \bar{y}}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}} \cdot \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \tag{2}$$

In Equation (1): t is the single overall student's t test (n<30), \bar{X} is the sample mean, μ is the overall mean, σ is the overall standard deviation, S is the sample standard deviation and n is the number of samples.

In Equation (2): t is the student's t test of independent samples, \bar{x} is the sample mean of sample x_1, x_2, \dots, x_n , \bar{y} is the sample mean of sample y_1, y_2, \dots, y_n , S_1^2 and S_2^2 are the corresponding two-sample variances, and n_1 and n_2 are the corresponding two-sample volumes.

The analysis of the data shows that there is a significant positive correlation between the artistry of the wall painting landscape, the appearance of the village and the development of tourism and the income of the villagers, which provides ideas and technical paths for the optimization of the wall painting design.

4. Wall Painting Design Optimization and Effects of M Village

4.1. Current Situation

Through field research, the number of wall-painted landscapes in Village M was first counted, then the types of wall paintings were classified, more over the strengths and weaknesses and corresponding issues of the current wall painting in this village were analyzed, after comprehensive evaluation, overall analysis can better propose strategies for optimizing rural wall art and making the wall painting landscape more effective in serving people's lives and villagers.

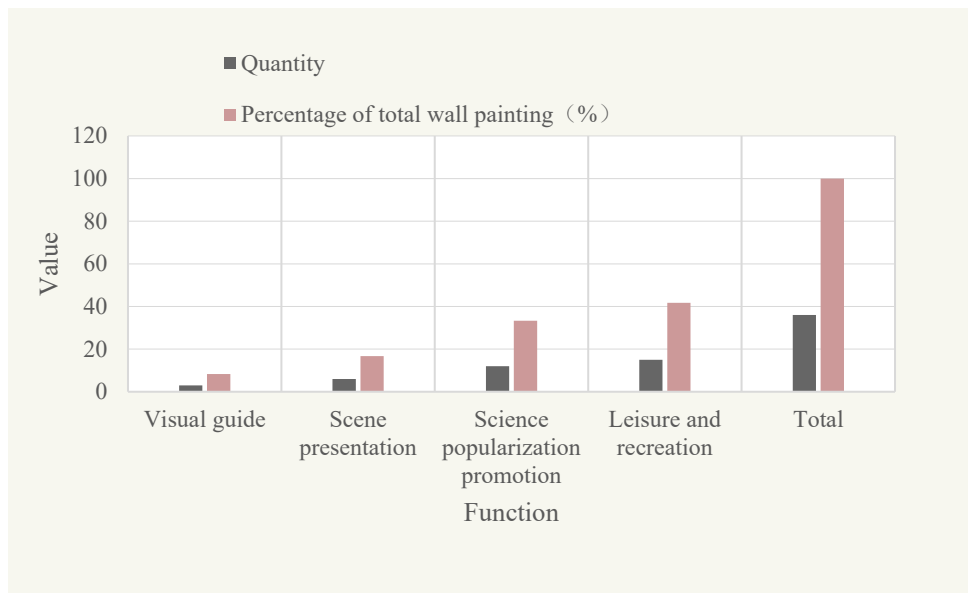


Figure 1: Distribution of wall painting types.

From the classification of wall paintings in M village in Figure 1, it can be clearly seen that in terms of function, leisure and recreation accounted for the largest proportion of the wall paintings in M village, reaching to 41.7%. At this ratio, adding some wall paintings with other functions and optimizes

the existing wall paintings in terms of vague theme content and unclear main features. Therefore, in order to strengthen the distinctive features of egrets in M Village's egret scenic area, it is also necessary to better integrate relevant public facilities and combine them with wall painted landscapes, so as to make the countryside full of vigor and vitality. The wall painting landscape design based on visual guidance only accounts for 8.3%. Therefore, increasing attraction guidance, strengthening and highlighting existing content will be an effective approach. For 16.7% of the scenes presented, the strategy is to design more small wall paintings with different themes and increase the content of interaction with people to enhance the fun of wall paintings. Lastly, functional wall paintings used for science popularization promotion should also be further improved and optimized for interactivity, so that people can have a better understanding of them.

4.2. Wall Painting Design Optimization

In the optimization strategy, a survey and analysis were conducted on the existing wall painting landscape in M Village. The results showed that there are still some areas for improvement in wall painting, so it is necessary to design wall painting for different regions and types. Based on this and the design strategy, corresponding upgrading and optimization strategies should be taken.

According to the type distribution, the specific compensation functions and optimization methods of each block were compared, and the positioning and functions of the corresponding landscape planning and design blocks for this area were analyzed. First, from primary to secondary, an analysis was conducted on the display and expression of existing wall painting landscapes to see if they match the current demand for wall painting landscape management functions in the block. Next, following the principle of practical and economic rural design, the mural art and 3D art expression form as a reference, from which the four aspects that urgently need to be modified to optimize the design, the specific optimization strategy is shown in Table 1.

Table 1. Strategies for optimizing wall painting.

Optimized block	Optimize wall painting content/function	Optimization methods
Village parlour	The overall visual guidance of the scenic spot	Add egret elements in hand-drawn maps and wall paintings
Citizen farm	Entrance signage and production promotion	VI memorial archway and personalized signboard show the history of the village
Bird Garden	Egret space organization exhibition area	Increase corridor facilities, plant landscapes, and sculptures to assist in science popularization and promotion
Fisherman's life	Fisherman's residence signs, production culture intensified publicity	Scenes of catching the seafood, wall paintings of fishing culture, fish element houses, and fish equipment display area

Near the fisherman, a set of wall paintings with a fish theme can be designed, taking Figure 2 as an example; it can also draw inspiration from the indoor fishing culture themed wall painting of a city museum, taking Figure 3 as an example. This allows tourists to enter the fishing house and feel the charm of the fishing industry. On rural roads, making some fisherman living scenes to guide tourists, which is in order to stimulate their interest and let them choose different activities to experience the customs of fishermen, thereby by a series of wall art creation and guidance that must be promoting the development of rural tourism and economic growth.



Figure 2 Source: photo by Duan Junli, Zhejiang News Client
<https://zj.zjol.com.cn/news.html?id=1591839>

Figure 2: Optimization of fisherman's living outdoor wall painting.



Figure 3 Source: Author's selfie

Figure 3: Indoor three-dimensional wall painting of fishing culture in a city museum.

4.3. Rationality of Survey Questionnaire Framework

Firstly, experts provided the basic concept of wall painting. Fifteen experts argued: “Modern wall painting refers to the use of architectural space and internal environment to draw pictures on indoor walls, ceilings, and floors, as well as on outdoor walls and roads surfaces. The technique of this kind of painting is the painting itself, and it is also an artistic work that reflects people’s living environment.” This is the first time that the connotation of wall painting has been defined, providing basic theoretical guidance for future theoretical research. Secondly, the rationality of the questionnaire survey structure was analyzed. 14 experts evaluated the structural rationality of the wall painting market research as “highly feasible”, while only 3 experts rated it as “generally feasible”.

4.4. Resident Survey Results

According to the results of the questionnaire survey, residents have little knowledge about the drawing pigments used on walls, with only 12 people being very clear about the types of it. For wall painting materials, most people do not know what acrylic paint is and what it is used for. Due to a lack of understanding of the advantages of coatings themselves, the development of wall painting has been restricted. In fact, acrylic paint is a non-polluting, environmentally friendly, quick-drying paint with a full and vibrant picture. In terms of decorative effect, before the wall painting design optimization was carried out, only 20 people thought that wall painting had a very decorative feeling. However, after the design optimization, 71 people believed that wall painting was amazing, which gave this number a big boost. And the result obtained in the t-test formula is $t > 2$, which shows a significant difference in the attitude of the residents before and after the optimization of the wall design, and the changes in numerical values indicate that wall painting can bring people demands for beauty and enjoyment of life in built environments. When people see a painting on a wall on the street, 41.2% of them stop to take a look, and 36.5% of them stop to appreciate it multiple times whenever they have free time, as shown in Figure 3. In addition, 65.9% of residents stated that wall painting should exist as a decorative form in public spaces, as shown in Figure 4. When people see a painting on a wall on the street, 41.2% of them stop to take a look, and 36.5% of them stop to appreciate it some times whenever they have free time, as shown in Figure 5. For the future wall painting materials and tourism industry, this is also a good intangible marketing opportunity, with increased interest in wall painting, which will inevitably be accompanied by the impulse of consumption, a prospect economy and profits increase.

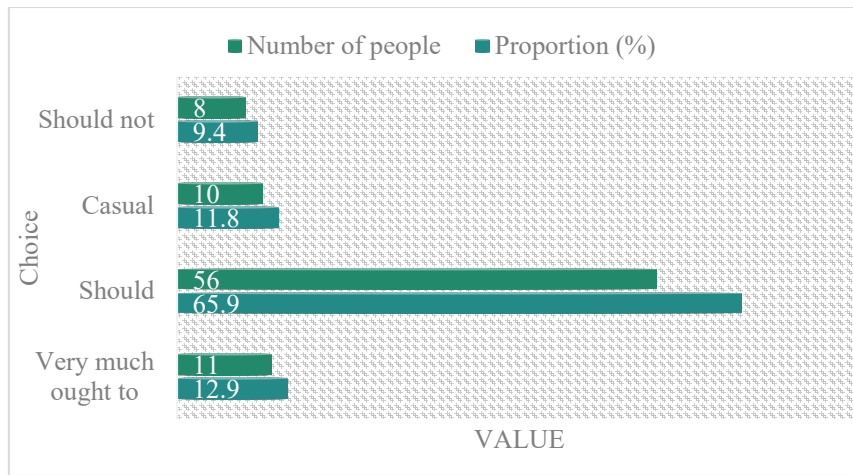


Figure 4: Survey results on whether wall painting should be applied to public spaces.

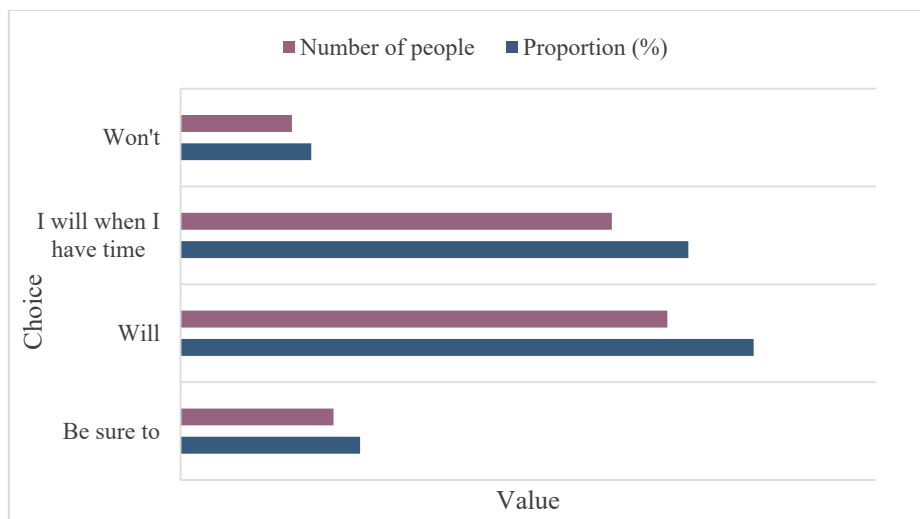


Figure 5: Survey results on whether to stop and watch when seeing wall paintings on the street.

5. Conclusions

Under the background of increasingly diversified global culture, wall painting art in architectural design has been recognized and loved by more people, which is also the contemporary aesthetic trend in a sense. Wall painting is derived from the ancient mural art and absorbs the essence of traditional murals, graffiti and sculpture art. So far, people in various countries are still widely used in different decorative spaces and constantly innovate and develop in the field of modern decoration. Through the analysis of the current situation of wall painting both domestically and internationally, the design principles of wall decoration are used as the basis to optimize the design of the expression of wall art in M village, further showing the characteristic art wall painting with the theme of egrets, which has been widely accepted by the villagers and has promotion value for beautifying the countryside and enhancing the fun of life. However, the design of wall art in terms of focusing on characteristic themes, abstracting local art elements and reconstructing multi-dimensional spatial expressions needs more innovative thinking and practice, which still needs to be explored in depth discussion.

Acknowledgement

This work was financially supported by 2021 Guangzhou Nanyang Polytechnic College's curriculum ideological and political reform project "Building Materials and Testing" (NY-2021CQ-KCSZ001).

References

- [1] Glen Berseth, M. Brandon Haworth, Muhammad Usman, et al. (2021). "Interactive Architectural Design with Diverse Solution Exploration". *IEEE Trans. Vis. Comput. Graph*, 27(1): 111-124.
- [2] Agnieszka Mars, Ewa Grabska, Grazyna Slusarczyk, et al. (2020). "Design Characteristics and Aesthetics in Evolutionary Design of Architectural Forms Directed by Fuzzy Evaluation". *Artif. Intell. Eng. Des. Anal. Manuf.* 34(2): 147-159.
- [3] Lingling Zhang. (2019). "Illustration Design Teaching Mode Based on Virtual Wall Painting Technology". *Int. J. Emerg. Technol. Learn.* 14(3): 190-200.
- [4] Nardo M., Renda, Bonanno, et al. (2019). "Non-Invasive Investigation of Pigments of Wall Painting in S. Maria Delle Palate di Tusa (Messina, Italy)". *Heritage*, 2(3):2398-2407.
- [5] Suryandari P, Asmawi T. (2019). "Transparent Leaves Education to be Painting and Crafts". *ICCD*, 2(1):102-107.
- [6] Makoto Omodani, Hiroyuki Yaguchi, Fusako Kusunoki. (2023). "Development of Electronic Tile for Decorating Walls and 3D Surfaces". *IEICE Trans. Electron.* 106(2): 21-25.
- [7] Stephen Smart, Keke Wu, Danielle Albers Szafir. (2020). "Color Crafting: Automating the Construction of Designer Quality Color Ramps". *IEEE Trans. Vis. Comput. Graph.* 26(1): 1215-1225.
- [8] Nikitina Irina P. (2018). "The Philosophy of Art, Aesthetics and Art History as Scientific Disciplines". *Journal of Flm Arts and Film Studies*, 4 (38):103-114.
- [9] Feltrin, Leccese, Hanselaer, Smet. (2020). "Impact of Illumination Correlated Color Temperature, Background Lightness, and Painting Color Content on Color Appearance and Appreciation of Paintings". *Leukos*, 16(1): 25-44.
- [10] Diego Marmsoler, Habtom Kahsay Gidey. (2019). "Interactive Verification of Architectural Design Patterns in FACTum". *Formal Aspects Comput.* 31(5): 541-610.
- [11] Sugita I Wayan, Setini Made, Anshori Yahyaa. (2021). "Counter Hegemony of Cultural Art Innovation against Art in Digital Media". *Journal of Open Innovation: Technology, Market, and Complexity*, 7(02): 147.
- [12] Gong Shanshan. (2022). "On the Visual Construction of Environmental Factors in Modern Art Works from the Perspective of Painting Art". *Journal of Environmental and Public Health.* (2022): 5922048-5922048.
- [13] Janna Bertchen van Grunsven. (2022). "Making and Embedding Humane Technologies: Can Artistic Practices Provide Normative Guidance?". *Adaptive Behavior*, 30(6): 569-571.
- [14] Dana E. Vaux, David Wang. (2020). "Research Methods for Interior Design: Applying Interiority". New York: Taylor and Francis, 1st Edition.
- [15] Chamseddine Barki. (2021). "Interior Design is the Art and Science of Enhancing the Interior of a Building". *Journal of Steel Structures & Construction*, 7(12): 1.
- [16] Wu Kang, Fu Xiaoming, Chen Renjie. (2022). "Survey on Computational 3D Visual Optical Art Design". *Visual Computing for Industry, Biomedicine, and Art*, 5(01): 31-32.
- [17] Je-ho Oh, Chung-Kon Shi. (2021). "A framework for Interactive Artwork Based on Cultural Heritage: Focused on the Evaluation of Artistic Value in the Artwork 'DeBallution' Prototypes". *Digital Creativity*, 32(4): 275-292.
- [18] Zare Gharegheshlaghi S. (2019). "Public Art in Public Space: Tracking Graffiti and Mural Art Practices in Contemporary Tehran". Ankara: Middle East Technical University.
- [19] Lv Shan. (2022). "Research on the Application of Wall Painting in the Public Space of Old Urban Area". Chongqing: North China University of Science and Technology.
- [20] Li Zhiyang. (2022). "Wall Painting Art in Interior Design". *Construction Economics*, 43(04):109-110.