

Research on color planning of campus buildings in Shenyang Jianzhu University

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Abstract. This paper is based on the perspective of regional architectural color planning and selecting campus buildings in cold regions as an example, taking architectural color as the research object, making a multi-viewpoint research on the use of color and its influencing factors. This article conducts actual investigation on the color of exterior facades of buildings in different areas of Shenyang Jianzhu University Campus, systematic evaluation and suggestion on architectural color of Shenyang Jianzhu University on the basis of Munsell color solid system.

1 Introduction

When the reflection of light is mapped to the human eyes, color is produced. It's closely related to human physiological structure, forming color perception and perception effect and then further stimulate human potential physiological and psychological responses. People live in space, which is full of architectural colors. It affects human visual nerve, and then reflects the psychological demands of living environment.

Architectural color can be divided into architectural appearance color and interior color. In this study, the object is only to analyze and interpret the architectural appearance color. Its composition includes the color of the building facade, the color of the building roof and the relationship between the color of the building monomer and the color of the building complex.

2 The function of architectural color and the importance of campus architectural color planning

The buildings and its external environment is related to the architectural color of planning and design. Proper use of architectural color is one of the important elements in evaluating the visual effect of buildings. If the architectural color matching effect is excellent, audiences can accurately perceive the characteristics of buildings and deeply understand the regional individuality of the surrounding environment of buildings. It determines the cultural personality of the city and comprehensive

reflection of regional cultural background and functional attributes, besides, its creating the impression of city and regional culture.

Architectural colors in the construction of Chinese university campuses can highlight their historical origins, cultural connotations and regional characteristics, and show the advantages of teaching, disciplines and humanistic environment of the school. On the other hand, as far as students are concerned, college campus is a special environment for life in the future. The color of campus architecture makes the visual elements they see every day, which exerts a subtle influence on students' visual perception of the cultural and environmental characteristics of colleges and universities. The distinctive geographical and climatic characteristics of the four seasons in the cold region make the campus buildings in the cold region have special color feelings and characteristics. Based on this point, the author started from the perspective of architectural color planning and design of modern urbanization and directionally choose the cold campus-the facade color of the campus of Shenyang Jianzhu University as the object of study. In the process of discovering the problem, and then put forward the way of color planning and design of campus buildings in cold regions.

3 The present state of color planning on campus buildings in Shenyang Jianzhu University

Shenyang Jianzhu University was founded in 1977, the

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original campus is located in Wenyi Road, Shenhe District, Shenyang City. And there's another east campus is located in Tiantan Street, Culture Road, Dongling District, Shenyang City. The main colors of the buildings in the former West Campus and the East Campus are mainly yellow, gray, white and brown. The old school campus have been demolished. In 2003, new campus built and put into use in Hunnan, Shenyang. It is located at No.25 Hunnan Middle Road, Hunnan District. The main campus covers an area of 1500 mu with a building area of 500,000 square meters. The new campus includes teaching area, living area, office area, campus landscape area (paddy field, historical buildings in Shenyang), gymnasium, library, etc. The teaching area is a grid-like courtyard combination with oriental cultural connotations, which is connected with the 756-meter-long first Asian cultural

corridor.

In order to accurately study the application of architectural color in the campus of Shenyang Jianzhu University, the author made a field investigation of the whole campus and we choose sunny, cloudy and cloudy weather in the morning (6:00-7:00), afternoon (2:00-3:00), evening (4:00-5:00), and select different seasons (spring, summer, autumn and winter) for research and evidence collection in order to ensure the uniformity of sample collection. The collected data are scientifically summarized and sorted out according to Munsell's color solid system. And then, according to the size of the color area, the status quo of the new and old campus building color is analyzed according to the different attributes of color (hue, lightness and purity) by the classification means of main color, auxiliary color and decorative color.



Table1 Shenyang Jianzhu University

3.1. Analysis of architectural color

1) Teaching area

The teaching area of Shenyang Jianzhu University is the main building of the whole campus, which is including teaching buildings, corridors, office areas, as a whole, each area is closely connected and grid-shaped, with several courtyards in the middle. Investigation shows that the main color of the teaching area is yellow-brown (YB) color system and some individual areas are using a combination of yellow-red-brown (YRB) colors. Architecture-subject color luminosity is concentrated in the range of 5-10, of which 6-7 (mid-luminosity) is the most which is about 90%. The auxiliary color is mainly white (W). The decorative colors of the buildings in this area are mostly used in the doors and window frames of the buildings, as a result of there are many courtyards in the area, it is closely combined with the environmental color, and the color change is obviously affected by the season. The color purity of the main body of the building ranges from 3 to 5, of which 4 to 5 are the most concentrated, accounting for about 80%.

2) Living area

The teaching area of Shenyang Jianzhu University is the main building of the whole campus, which is including teaching buildings, corridors, office areas, as a whole, each area is closely connected and grid-shaped, with several courtyards in the middle. Investigation shows that the main color of the teaching area is yellow-brown (YB)

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3) Library, gymnasium

The gymnasium, library and teaching area of Shenyang Jianzhu University are relatively independent. The color of the main building is red (R), with an area of 80%. Decorative colors are mostly used in the doors, window frames, exterior walls of buildings, but the color consistency is relatively high, mostly gray brown (GB) combination. The color purity of the main body of the building ranges from 3 to 5, of which 4 to 5 are the most concentrated, accounting for about 90%.

4) Historic landscape architecture

Shenyang Jianzhu University has a large number of historic buildings in the courtyard area, including the school hospital and Bawang College. The overall color of the building is gray (G), with an area of 95%. Decorative colors are mostly used in the doors, window frames,

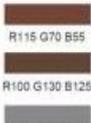
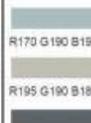
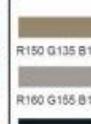
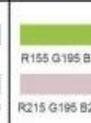
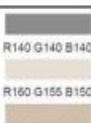
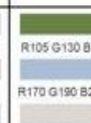
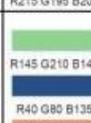
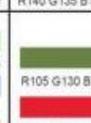
exterior walls of buildings, and mostly in the combination of red and green (RG). The color purity of the main body of the building ranges from 1 to 4, of which 2 to 3 are the most concentrated, accounting for about 90%.

5) *Modern architecture*

It mainly refers to the BOX assembled box building built in the courtyard and the China-German energy-

saving center. There is a great difference in the use of colors between them. BOX assembled box building is mainly composed of red, yellow and blue (RYB) with high brightness and purity and the gray system is the dominant system in the construction center of China-German energy-saving center, accounting for 98%.

Table2 The color of Shenyang Jianzhu University buildings

Architecture area	Main building	Dominant color	Subsidiary color	Decorative color
Teaching area	    <p>B1 Hall of Teaching Building The Long Corridor E2 Hall of Teaching Building Overview of the teaching area</p>	 <p>R110 G95 B65 R215 G210 B190</p>	 <p>R155 G160 B165 R230 G225 B230 R130 G65 B50</p>	 <p>R35 G35 B30 R85 G90 B85 R105 G125 B85</p>
Library and gymnasium	  <p>Library Gymnasium</p>	 <p>R115 G70 B55 R100 G130 B125 R140 G135 B140</p>	 <p>R55 G50 B50 R175 G170 B165 R205 G200 B200</p>	 <p>R210 G205 B230 R150 G225 B250 R105 G125 B65</p>
Office area	 <p>Office building</p>	 <p>R175 G145 B125 R80 G85 B95 R160 G165 B165</p>	 <p>R170 G190 B190 R195 G190 B180 R95 G100 B105</p>	 <p>R130 G140 B85 R130 G155 B130 R60 G45 B50</p>
Historic landscape architecture	  <p>Office building Bawang college</p>	 <p>R160 G155 B150 R135 G130 B125 R40 G30 B40</p>	 <p>R112 G140 B140 R70 G125 B115 R115 G90 B75</p>	 <p>R150 G135 B110 R160 G155 B150 R15 G30 B35</p>
Courtyard architectural landscape area	  <p>BOX assembled box building Lei Feng's courtyard</p>		 <p>R60 G70 B75 R110 G105 B110 R70 G75 B65</p>	 <p>R155 G195 B75 R215 G195 B200 R220 G220 B225</p>
Public space	    <p>Parking lot Tieshi square West square Main gate square</p>	 <p>R140 G140 B140 R160 G155 B150 R210 G190 B170 R45 G40 B40</p>	 <p>R100 G100 B95 R105 G90 B90 R130 G135 B140 R215 G195 B200</p>	 <p>R105 G130 B70 R170 G190 B215 R220 G215 B210 R140 G135 B120</p>
Living area	    <p>High-rise dormitory No.9 dormitory No.13 dormitory No.1 canteen</p>   <p>Muslim canteen No.4 canteen</p>	 <p>R205 G200 B200 R170 G170 B155 R155 G135 B110 R155 G160 B165</p>	 <p>R145 G210 B145 R40 G80 B135 R230 G145 B120 R190 G145 B100</p>	 <p>R105 G130 B70 R230 G30 B45 R140 G110 B100</p>

4 Existing problems and optimizing measures

4.1. Problems

In the process of investigating and analyzing the overall architectural color of Shenyang Jianzhu University, the following problems are found. The color of the main building is single and unchanged, and the space sense of vision needs to be strengthened. The relative harmony and consistency of architectural colors in teaching and living areas is the independence of colors in individual areas. There is no complete contrast and correlation between them, and the system needs to be strengthened. There is no correspondence between environmental landscape and architectural color. They are

independent. Landscape sketches and the color of space markers are arbitrary in design and weak in coordination with space. The relationship between the color of individual entrance space and the corresponding color of the building street space around the city is weak. The color relationship around the central water system should be more integrated. The color relations around each square in the campus, such as entrance square, Longtan square and Tieshi square, are isolated and inconsistent. The main courtyards on campus, such as Lei Feng's courtyard and dormitory courtyard, are mostly of the same color and have low recognition. BOX assembled box building are brightly colored, but they are slightly colourful collocates with courtyard architectures. The color of the parking lot is rather monotonous. Without space landscape design and color design, it is impossible to form a system with the surrounding building color in spring, summer and autumn because of the tree shelter.

Table 3 Four seasons colors of Shenyang Jianzhu University buildings



		
R100 G160 B90	R135 G120 B95	R240 G205 B125
R45 G80 B55	R250 G240 B210	R195 G160 B80
R110 G190 B215	R130 G140 B135	R140 G160 B130
R230 G230 B215	R120 G125 B130	R60 G65 B70
R240 G240 B235	R185 G185 B185	R110 G100 B90
R230 G230 B230	R60 G60 B55	R35 G40 B40

4.2 Optimized Ways

The overall visual effect of architectural color shows the style and characteristics of the area. People who are active in the region often feel the architectural color in close proximity and are more likely to have a connection with psychology. In the process of campus color optimization, when the detail color matches with the macro architectural color, it should be planned from the perspective of color psychology.

1) We need to enhance the continuity and systematicness of the colors in each region. From the perspective of color recognition, coordinate the relationship between the surrounding environment and architecture. Further optimize the color of campus landscape, make rational use of regional landscape, highlight the campus culture and realize the continuity of color.

2) In the process of color planning, colleges have the problem of homogeneity. As a cold region college, we should further strengthen the unique regional characteristics of the north through color design.

3) While reflecting the campus culture through color, we actively put forward the color garbage, find the characteristics suitable for our school, retain the color characteristics of the combination of regional and cultural

context.

In fact, colleges and universities are the areas where people are concentrated. Its nature and characteristics also determine the use and collocation of architectural colors in colleges and universities. Architectural color design in art colleges can be different and bold, seeking novelty. While in normal colleges and universities, architectural color design should be simple, calm and generous. The research on campus architectural color in colleges and universities can reflect its current situation and problems more intuitively, which plays an important role in shaping a high-quality campus cultural atmosphere, establishing a good campus color landscape and continuing the urban regional characteristics.

Acknowledgements

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