

# Research on Architectural Design of University Museum under the Influence of Campus Culture

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**Abstract:** University museums have a long history. They play an important role in university teaching, scientific research and creative cultural life. At the same time, university museums also shoulder the important task of carrying out popular science education for the public, promoting quality education, transmitting humanistic spirit, national spirit and human civilization. There are similarities and differences between University Museum and university culture construction. It has become a space to inherit the blood and cultural soft power of the University, and has accumulated the historical thickness of campus culture; It has become the second classroom of campus culture construction and widened the display breadth of campus culture; It has become a palace integrating knowledge education and cultural transmission, extending the educational depth of campus culture. University museums have become an important part of University Cultural Construction in a new stage of development. Cities or universities without museums are poor. This paper discusses the role of university museums in the construction of campus culture from three aspects: cooperating with the construction of campus culture, carrying out campus culture education activities and extending the depth of campus culture education. We should give full play to the carrier role of university museums, explore practical models and promote the development of campus culture. This paper discusses the practical mode of University Museum in the construction of campus culture from three aspects: cultural sharing, cultural communication and cultural inheritance.

## 1. Introduction

Museum phenomenon originated from people's awareness of collection and commemoration, which resulted in the collection of rare items and the protection and utilization of memorial relics [1]. Anyone who goes to civilized countries for inspection or sightseeing, or goes to foreign universities to study or visit, the museum is the most eye-catching cultural landscape [2]. The museum, built in the university, is an integral part of campus culture [3]. The museum is a window to display the campus culture of colleges and universities, and its development level reflects the historical tradition, school management concept and discipline strength of colleges and universities [4]. China's university museums have assumed the role of serving the teaching and scientific research of universities, introducing the campus culture of universities and improving the scientific and cultural quality of college students and citizens [5]. The university belongs to the university, and has been built and developed in the environment of university culture, becoming an important part of the university cultural system and an important carrier of cultural communication [6]. University's development history, school-running philosophy, management system and other factors will affect the construction and development of museums, while advanced culture is the key factor to guide the construction of humanities museum [7]. The planning, design, research, construction and other processes of the museum are essentially the process of improving research, learning, publicizing and practicing advanced university culture [8].

The content of cultural and educational construction in modern colleges and universities has been expanded and enriched with the times. The educational mode of colleges and universities is constantly updated, and various teaching modes and facilities have been optimized and improved [9]. University Museums shoulder the important mission of inheriting campus culture. They record not only the development history of universities, but also the efforts of every generation of educators and the educational spirit of the times [10]. Nowadays, the construction scale of

university museums is expanding, and the cultural construction quality of university museums is the primary concern of colleges and universities [11]. Therefore, the campus community education strategy of university museums is to combine museum education with school discipline courses to form a campus community education plan synchronized with school teaching [12]. Establish a volunteer organization of the museum in the campus community, take the museum as the carrier of campus cultural and academic activities, and make rational use of the school's media resources for external publicity [13]. The contribution of university museums to campus culture is mainly reflected in providing teachers, students and guests with a place to visit and receive education, providing physical reference for teachers' scientific research work, and creating an interactive learning platform [14].

## **2. The influence of campus culture on the architectural design of university museums**

### **2.1. Architectural design concept of University Museum**

Universities have a unique position in the historical evolution of museums [15]. With the establishment of new disciplines such as comparative studies in mineralogy and biology in European universities, the collection of physical objects in natural disciplines by higher education institutions is more extensive and systematic. For the first time in Europe, a real university museum has appeared in universities. The main features of the early university museums are that the collections directly related to the university disciplines and academic research occupy the core position in the museum, and the functions and roles of the museum are concentrated in the research and teaching on campus. Under the impetus of modern academic development, university museums in Europe, America and Oceania have made great progress. Today's university museums not only inherit the main features of previous university museums, but also are endowed with some new features of the times. The service objects of the museum include traditional objects: college students and visiting scholars; But also the general public at all levels. Apart from providing cultural services for academic research and a wider range of fields, museums shoulder the social education responsibilities similar to those of public museums, expanding the scope of traditional education university students to the breadth of social education. The form of education has also expanded from formal education such as research and teaching to non-formal education such as display and entertainment. The future of the university is full of opportunities and challenges. The most famous university museum in China is Sichuan University Museum, whose predecessor was the Antiquities Museum of West China Xiehe University. This museum is also the earliest museum established in Southwest China. It introduced the theories and models of modern western museums to the academic circles in southwest China, and pioneered the collection, research and display of cultural relics in southwest China. After decades of ups and downs, today's Sichuan University Museum has become the leading large-scale comprehensive museum among domestic university museums. The organization model of the museum is shown in Figure 1.

The social function of university museums is exactly the same as that of general museums. They are the collection, preservation, research, display and display of cultural relics and exhibits, publicity and education for the public and the dissemination of spiritual civilization; The functional function is to provide various forms of teaching services as the educational base of the school. From a worldwide perspective, the initial function of the museum is the collection, preservation, research and educational function, which is derived later. Especially since the middle of this century, with the progress of the times, the rapid progress of culture, education and science and technology, the educational and storage function of the museum has shown strong vitality, which is the best point for the school to fit with the museum. The functions of the school Museum mainly include teaching function, research function, collection function, display function and publicity function. According to the nature of universities, university museums can be divided into comprehensive university museums, normal university museums, University Museums of science, industry, agriculture, medicine, science and technology and university museums of art. University museums and social public museums have the same function, but also have their particularity, which is mainly reflected

in the differences of collection sources and scale, teaching and treatment forms and management and operation. University museums are mainly for teachers and students of the University. In terms of teaching, intuitive teaching is more prominent. Through the physical objects of the museum, make full use of the visual display form of the museum collection, so that students can have a deeper understanding of the knowledge learned in class. This is also the most distinctive feature of university museums in the implementation of educational service functions.

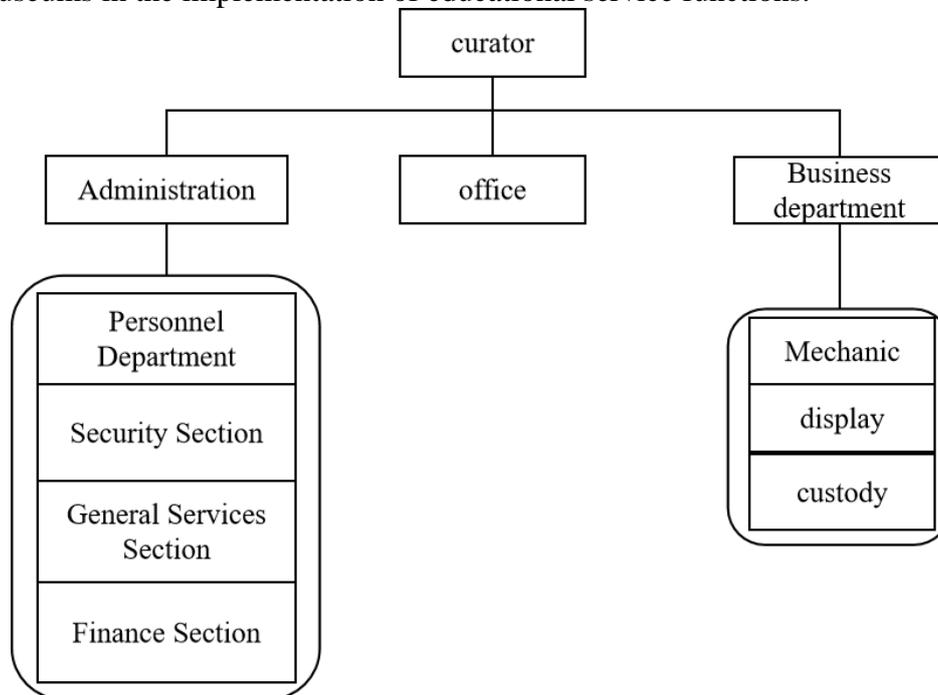


Figure 1 The museum organization model diagram

## 2.2. The hierarchy of campus culture

The concept of university culture is divided into a narrow sense and a broad sense: the narrow sense of university culture mainly focuses on the study of spiritual culture, and sometimes it is inter-used with concepts such as university philosophy, university ideals, university spirit, etc.; the broad concept will be refined culture, institutional culture And material culture is regarded as an organic part of university culture, studying their respective characteristics and their mutual connections, mutual influences and overall effects. University material culture is the material manifestation of culture, forming the material conditions for university teaching activities, scientific research, and serving the society, and is the material carrier of university spiritual culture and institutional culture. Material culture generally includes the architecture, landscape, natural environment, and various equipment and facilities in the university campus space. However, in the long-term development of the university, it is affected by the university's history, tradition, humanities and other factors, as well as the university's management system, Under the influence of educational systems and other institutional cultures, different universities have different physical environments, presenting campus characteristics and cultural temperaments of different styles. The geographical location, natural environment, and climatic conditions of the campus are the basic carrier of all material cultures and form the basis of the university's material culture. Universities in different locations exhibit different physical environment differences, which affect the overall planning layout of the campus and different geographical features. The climatic conditions restrict the design of school buildings, and the difference in natural environment has formed different landscape features.

University spiritual culture is an ideological and psychological environment unique to universities, accumulated in the long-term development, recognized by several generations of teachers and students, and constantly exerting an important influence on latecomers, such as values, belief pursuit, school spirit, study style, moral sentiment, etc. It acts on all links of teaching,

scientific research, management and campus life, and is the essence of one kind of university culture that is different from another, mainly including university ideas and university spirit. University spiritual culture is intrinsic and needs to be expressed through material entities. University majors directly affect spiritual culture. Spiritual culture in science and engineering university campus reflects a high degree of rationality and precision. Therefore, the campus environment is mostly characterized by regularity and orderliness. Students' life is planned and fast-paced. The spiritual culture of the humanistic university campus is completely opposite, full of the pursuit of humanistic history and artistic creation, and the campus space is full of sentiment, poetry and strong sense of history. Most of the students are literate, and their manners are elegant. Teaching system, management system and living system regulate the behaviors and activities of university teachers and students. After long-term accumulation, people's institutional psychology has been formed, and various behavior patterns of people's study and life on university campus have been shaped. Under the restriction of institutional culture, campus culture is different from other social cultures, which makes campus culture have the characteristics of super-regional.

### 3. Architectural Form and Environmental Design of University Museum

#### 3.1. Analysis of architectural form characteristics of University Museum

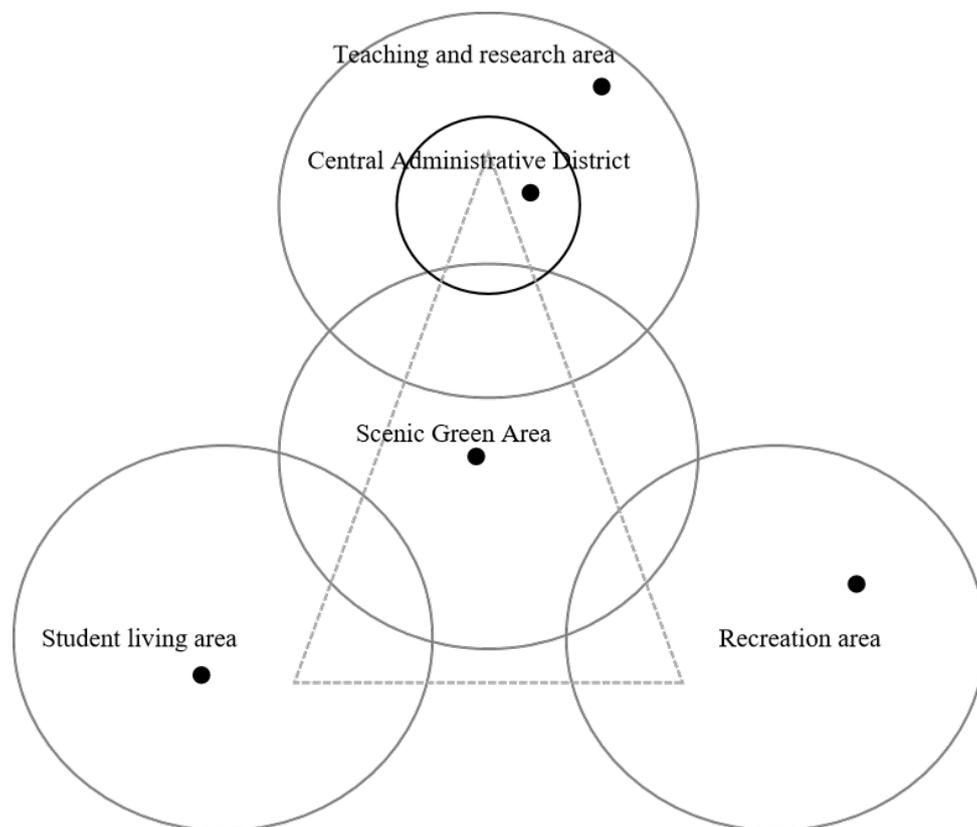


Figure 2 Location type of University Museum

As the cultural front of the university, university museums should reflect the characteristics of campus culture, play a good role as a carrier, explore practical models, and promote the development of campus culture. University museums gradually explore practical models, and give full play to the role of university museums in educating people and serving the society. The location of campus buildings on the campus can be roughly divided into the following categories: located in the central administrative area, located in the teaching, learning and scientific research area, located in the cultural and recreational area, and located in the scenic green area. Traditional Chinese architectural forms are often designed in liberal arts college museums. The large roof, column structure, bay and depth scale of traditional buildings, and traditional decorative patterns are all reflected in the architectural style of the museum. The archetypes of ancient Chinese buildings

express special cultural values and integrate the profound cultural accumulation of the Chinese nation. The traditional architectural form has a distinctive identity, and its artistic charm can be more prominent in the historical context of the campus. University museum buildings achieve the meaning of inheriting Chinese architectural characteristics through the construction of building volume, color, material, and traditional element symbols. This has a significant impact on highlighting the historical context of campus culture and presenting special traditional styles, and has an effect on the inheritance and development of traditional buildings in form, volume, and style. The Chinese traditional design of university museums has been improved after absorbing the characteristics of traditional architectural structures. The extraction of this kind of creation is not simply imitating and copying, but seeking dialectical unity in the development of the new era, integrating multiple cultures, reflecting the spirit of the times, and highlighting the spirit of campus culture. The location types of university museums are shown in the figure 2.

Some buildings in the Chinese University Museum belong to Western architectural forms. Since many universities in the early days of China were funded by Westerners, that era was in the embryonic stage of Western capitalism entering China. Its campus architecture has absorbed the architectural styles of Western countries in style, and has also become a landmark building that records the special history of the city. Abstract Geometric forms are more common in contemporary university museums due to their simple appearance, high utilization rate of indoor space, and flexible exhibition space layout. Most university museums with abstract geometric forms as architectural features are science and technology museums. It is a kind of exhibition education that does not pay attention to historical collection, but pays attention to the flexibility of audience participation. Such a university museum aims to develop people's scientific creativity and spirit, and create a rational environmental space. As a platform for disseminating and displaying the latest contemporary technology, the Museum of Polytechnic University uses abstract geometric forms as the architectural image, which embodies a rational thinking creation. The exhibition area is not only the main part of the museum building, but also the space used by the audience. The audience space in the exhibition area can be roughly divided into three parts: viewing space, rest space and traffic space. According to the requirements, the calculation of the reasonable number of users is based on the determination of the per capita area as the main indicator. The reasonable number of visitors to the museum should be the sum of the three parts of the number of visitors. The basic expression is:

$$A = A_1 + A_2 + A_3 = \frac{S_1}{Si_1} + \frac{S_2}{Si_2} + \frac{S_3}{Si_3} \quad (1)$$

Where  $A$  is the reasonable number of visitors to the museum, and  $A_1$ ,  $A_2$ ,  $A_3$  is the number of visitors to the viewing space, rest space and transportation space respectively.  $S_1$ ,  $S_2$ ,  $S_3$  is the net area of viewing space, rest space and traffic space respectively.  $Si_1$ ,  $Si_2$ ,  $Si_3$  refers to the per capita area of spectators in viewing space, rest space and transportation space respectively. The calculation expression of the per capita floor area of the audience is:

$$Si_1 = (L + D/2) \times D \quad (2)$$

In a museum, the reasonable visual scale of the audience must meet the visual characteristics of the human eye to ensure that the audience does not cause eye fatigue during the viewing process. For this reason, under the premise that the detailed feature size of the exhibits remains unchanged, the distance between the audience and the exhibits should be reduced accordingly. At this time:  $L = 5/2 = 2.5m$ , the corresponding area of the audience per capita should be:

$$Si_1 = (L + D/2) \times D = (2.5 + 0.5) \times 1 = 3.0m^2 \quad (3)$$

When the audience views the three-dimensional exhibits, the calculation principle of the area per capita is shown in Equation 2, and the calculation expression is:

$$Si_1 = (\pi R_1^2 - \pi r^2) / 2\pi R_2 / D \quad (4)$$

The formula  $r$  is the size of the three-dimensional exhibit measured by the radius, according to the result of formula 2:

$$R_1 = r + L + D / 2 = r + 2.5m + 0.5m \quad (5)$$

$$R_2 = r + L = r + 2.5m, D = 1m \quad (6)$$

Substitution formula 3:

$$Si_1 = (6r + 9) / (2r + 5) \quad (7)$$

It can be seen from Equation 4 that when the size of the exhibit is small, its area can be ignored,  $r = 0, Si_1 = 1.8m^2$ ; when the exhibit tends to infinity,  $r = \infty, Si = 3.0m^2$ ; generally under the condition of an economic column network, the size of the exhibit is taken as  $r = 2m, Si_1 = 2.33m^2$ .

When there are two-dimensional exhibits and three-dimensional exhibits in the museum, the value  $Si_1$  can be adjusted according to the above calculation results and the actual situation, and then  $Si_1$  can be substituted into equation (1) to obtain the reasonable number of visitors in the museum.

### 3.2. Design thought of environmental construction of University Museum

Colleges and universities have become an important design content in contemporary museum construction in China. However, there are few visitors who actually use and are familiar with university museums. Even some students at school have not been to the museums on campus near graduation, not to mention the widespread awareness of museums by the public. There are various forms of single buildings in colleges and universities, but it is simple and general to carefully consider the environmental design around the buildings. Establishing a suitable environment atmosphere of university museums is beneficial for students to experience the warm atmosphere of campus culture in the external environment of museums. At the same time, it is also an important venue for shaping the historical background and humanistic quality of campus. Therefore, it is an important means to promote the construction of university museums in China to seek the environmental design that is eclectic and unified inside and outside.

The humanistic spirit on campus is gradually enriched and improved with the development of the University, and has experienced long-term historical accumulation with stable and rich connotation. Therefore, the conception of environmental design of university museum must be deeply considered and planned according to the historical, cultural and humanistic characteristics of the campus. As long as the excellent environment is coordinated with the architecture of the University Museum, it can well reflect the historical and cultural depth of the University Museum. The history and culture of the campus reflects the development and change of the campus over time. The buildings in different historical periods of the university campus have their own styles and characteristics, and record and witness the architectural forms of each era of the campus. Therefore, when designing the University Museum, we can refine from various structural elements, make an overall choice of the architectural color of the museum, and fully reflect the overall campus historical context. This design idea is conducive to the protection and reuse of some old buildings in Colleges and universities in China. The architectural style of taking advantage of the trend has created the overall unity of the old and new buildings of the museum, and has become a visually unified environmental effect of University Museum. The most original, simple and selfless environmental space in nature, while the University Museum building is an introverted, calm, generous and historical building. University Museum buildings should have a more harmonious natural symbiotic relationship with the environment. Therefore, the design of University Museum according to local conditions can achieve the real unity of architecture and environment, and realize the real integration of University

Museum and natural environment by conforming to the natural environment and hidden architectural form. The design can also set off the buildings with mountain and water features, organize the group relationship of buildings in combination with landform, promote the internal correlation of vegetation, and retain the original topographic characteristics and natural features to the greatest extent.

#### **4. Conclusions**

The museum belongs to the university and is a cultural window of the university. It has been built and developed in the environment of university culture, becoming an important part of university culture system and an important carrier of cultural communication. Colleges and universities have made great contributions to university education and scientific research, and played an important role in promoting the combination of advanced science and technology and advanced culture, improving the national scientific and cultural level, and creating a harmonious society. At the same time, they also shoulder the heavy responsibility of carrying out popular science education for the public, promoting quality education and inheriting human civilization and national spirit, which is an inseparable part of campus culture construction. The construction of campus museums is an aspect of measuring the teaching infrastructure of colleges and universities. With the gradual improvement of the construction of campus museums, especially the old building museums on campus, the campus culture has a deeper connotation, and the museums are increasingly becoming the characteristic cultural landscape of the campus. Combining with the teaching methods of campus courses, we can develop a curriculum system combining textbook theory with practical research, so that students can feel and learn in a more intuitive way. Compared with boring classroom teaching, practical teaching is more comprehensive and systematic. The optimization and progress of these courses will continuously improve the realm and taste of the museum-style campus, and improve the cultural heritage and spiritual needs of the campus.

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