

# Research on Satisfaction Degree of Campus Public Space

—Take the West Area of Southwest University of Science and Technology as an Example

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## Abstract

Colleges and universities are the bases for cultivating high-quality creative talents, while the campus environment is an invisible classroom and a comprehensive education force that affects people. This paper investigates the satisfaction of teachers and students of Southwest University of science and technology on the use of typical public space in the west area, and makes a comprehensive analysis of the questionnaire data through Excel and SPSS software. The results show that in the typical public space represented by the west area central lake, Jiuzhou lake, qicaizhu square and light of science and Technology Square, there are still some aspects such as the type and quantity of supporting facilities, maintenance and management of public space, etc The number, location and quality satisfaction of lighting facilities and infrastructure are relatively low. Public space security facilities, lighting, landscape construction are related to the overall satisfaction of campus public space. Teachers and students are more satisfied with the overall evaluation level of campus public space. Based on this, combined with the field survey, this paper puts forward the promotion strategy to improve the construction of campus public space, in order to further improve and optimize the location distribution, functional configuration, infrastructure and other aspects of the campus public space.

## Keywords

Campus Public Space, User Satisfaction, Improvement Research, Mianyang City

## 1. Introduction

### 1.1. Background

Generally speaking, urban public space refers to the area of urban space with

public value, which mainly refers to the urban artificial open space, or the urban open space dominated by artificial factors [Zhou, 2005]. The outdoor public space of university campus belongs to the category of urban public space. In addition to the common functions with urban public space, the public space on campus has its special cultural background. As a special space type, it needs to meet the needs of university students in learning, practice and unconventional academic exchange [Ashihara, 2017]. With the continuous development of the socialization and opening of colleges and universities, the construction of public space has become a very important part of the campus.

## 1.2. Research Summary at Home and Abroad

Most foreign campuses are open Spaces, focusing on the overall design of campus planning on the basis of more attention to the sense of human experience. The public domain theory proposed by Arendt [Bonner, 2017] and Habermas [Fong, 2017] not only provides political and philosophical significance for public space, but also has a profound impact on contemporary urbanology. Claire Cooper Markus proposed the planning and design method of outdoor public space on campus from the perspective of human nature. He divided the outdoor public space on campus into base space and public green space. The site space is defined as the space adjacent to a particular building, including front porch, backyard and back door. The public green space is defined as the campus space used by everyone, and the campus entrance, the main square space, the scale, location and attributes of these Spaces are proposed [Claire, 2001]. In his systematic design research, Richard Daubert systematically elaborated the campus planning and design from three aspects: landscape, architecture and planning. IN his book *The Oregon Experiment*, Christopher Alexander described the ways and methods of the renovation of Oregon University, and put forward the user-composed management committee leading way. It is proposed that the organic order lies in the coordination between the whole and the details, and reflects the user's participation in the planning process of the campus, and the campus planning is developed in slices. It is proposed that the campus can be modeled in the design part, and summarized the modeling methods and contents. Finally, the feedback diagnosis planning and multi-party coordination principle are studied [Alexander et al., 2002].

In domestic research, there are a variety of different perspectives on the planning of campus public space. Kongjian yu with rice, crops, and the most economic elements such as local grass to build a campus environment, lets the student in a modern city environment learning book knowledge at the same time, and feel the natural process, the evolution of the four, crops in the spring and autumn and the food is reasonable, and through the reuse of the old material, the continuation of the history of feelings. Meng Fanhui tried to strengthen the cultivation of contemporary college students' social responsibility and explored the social responsibility of universities with publicity as the starting point [Meng, 2019]. He Jingtang discussed the new characteristics of contemporary

university campus planning and planning from the perspectives of higher education concept and campus layout planning mode [He, 2005]. From the perspective of urban design, Wang Jianguo discussed the overall layout, road structure and the connotation of building environment and places in university campus planning [Wang, 2002]. Zhu Yingjie pointed out the problems existing in the campus public space through the analysis of the lack of vitality of the current campus public space, and put forward five aspects that should be paid attention to in building the campus public space, so as to enhance the vitality of the campus public space and improve the quality of campus public life [Zhu, 2009]. Chen Jie took the Qishan Campus of Fuzhou University as an example to conduct post-use evaluation of campus planning, summarize whether there is deviation between the current situation and objectives of campus planning of Fuzhou University, analyze the reasons and put forward suggestions for further construction and reconstruction [Chen, 2011]. When studying urban public space, Jiang Difei put forward the concept of public space vitality and constructed spatial vitality from three dimensions of economy, society and culture [Jiang, 2007]. Later, based on the concept of urban space vitality, Zheng Lijun proposed the factors related to campus public space vitality, including physical environment, users' psychological needs, spatial accessibility, differences in population and differences in use time. Based on this, the composition of space vitality is put forward, including spatial density of campus landscape, spatial accessibility of campus, green comfort, spatial comfort and campus culture display, which makes a beneficial attempt for the evaluation of outdoor public space in university campus.

Colleges and universities are the bases to cultivate high-quality creative talents, while campus environment is invisible classroom, which is a comprehensive education force that affects people. At present, although more and more attention has been paid to the public space in colleges and universities, and many factors have made it beautiful and good-looking in planning. However, in the process of use, the existing planning and design functions have not been realized, but are forced to be transformed and replaced with other functions. In terms of research limitations at home and abroad, foreign researches on campus public space are less than those in China. Due to their different educational concepts, we can't apply the planning ideas of foreign campuses, especially public space directly to domestic colleges and universities. It is found that since the 1980s, China has gradually begun to study the campus planning, which has experienced the transition from focusing on the design of the building itself to the overall campus planning and design. However, in the aspect of public space satisfaction survey and research in China, most of them are aimed at cities or communities, and there are very few researches on the user satisfaction of campus public space. Therefore, this article in view of the campus planning and design of public space and lack of scientific and reasonable evaluation of the status quo, in the construction of west to southwest university of science and technology of several typical public space as the research object, the user satisfaction has

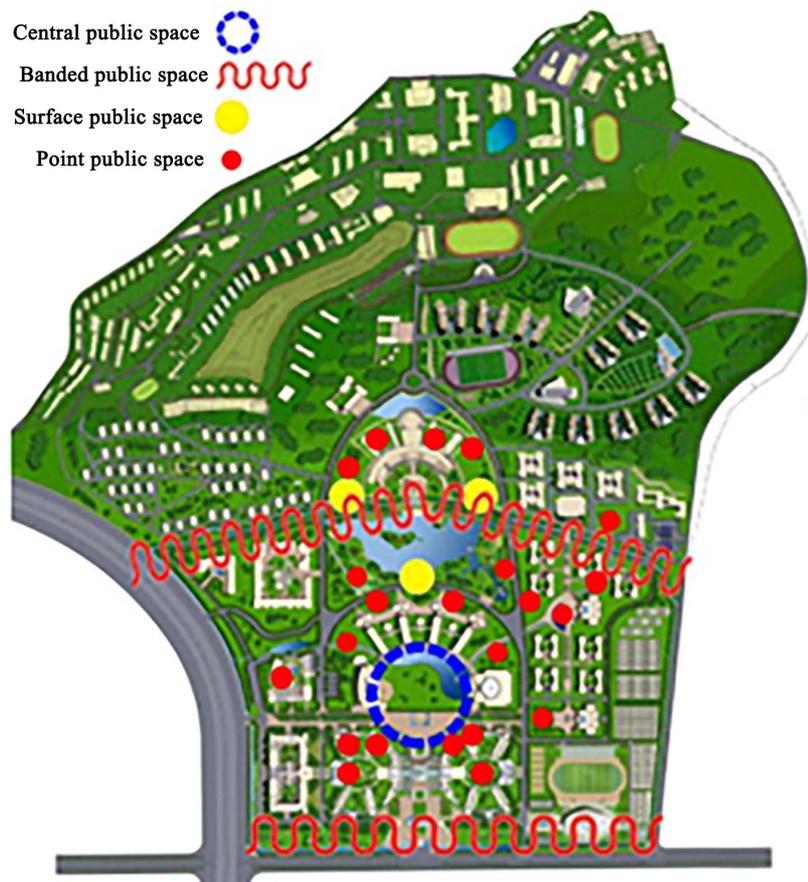
carried on the comprehensive evaluation research, and the relevant mathematical analysis, hoping for the further development of the campus public space to provide the reference value.

## 2. Overview of the Study Area and Research Methods

### 2.1. Overview of the Study Area

Southwest University of Science and Technology (SWUST) is a public university of science and technology, which is located in the North Science and Technology Park of Mianyang City, Sichuan Province. It covers an area of more than 4000 mu and is divided into two parts, the new campus and the old campus. The research area belongs to the western part of the new campus, which was built in 2000 and covers an area of about 2 million square meters. The land parcel contains two parts: mountain slope and flat dam, and there is a weir canal with sufficient water flowing through it. It faces to Fujiang and is adjacent to the main road of the city.

The structure of public space on the campus of Southwest University of Science and Technology is as follows: one heart, two belts and multiple spots, as shown in **Figure 1**. “One Heart” takes “Light of Science and Technology Square”



**Figure 1.** Public space planning structure of Southwest University of Science and Technology.

and “Jiuzhou Lake” as the public center of the campus. “Two belts” include the open landscape belt in front of the campus and the waterfront activity belt around the three major lakes based on Longxiyan. “Multi-point” includes “ethics square”, “school motto square”, “lake viewing platform” and multiple node Spaces are planned and designed around sports ground, student apartment, swimming pool, teaching building, student dining hall and other Spaces. From September to November in 2019, the author inspected the West District of Southwest University of science and technology on the basis of consulting relevant data. Through questionnaires and field surveys, the author selected four typical public spaces in the West District, namely “Central Lake”, “Jiuzhou Lake”, “light of science and Technology Square” and “colorful column square”, which are often visited by teachers and students.

## 2.2. Survey and Research Methods

### 2.2.1. Survey Methods and Questionnaire Design

This survey adopts the methods of field survey, field survey, issuing and collecting questionnaires, and field interview. Field survey and questionnaire survey are mainly adopted, and the questionnaire survey is divided into online and offline methods. Questionnaire survey was conducted in a random form. Questionnaire was issued on the spot in the typical public space area of the West District and filled in by the respondents on the spot. The questionnaire was taken back on the spot after completion. The questionnaire survey set up four evaluation levels for each index, which were very satisfied, satisfied, average and dissatisfied. The basic information is the user's gender, age, occupation and education level. The main content of the questionnaire survey is the survey of 17 technical points in five aspects of the natural environment, cultural environment, supporting facilities, management services and design factors of the typical public space in the western region. Is on the air is fresh, the water quality cleanliness, regional culture, regional characteristic, building size, dwelling place layout, tour and fitness facilities, public toilets and density of rubbish bins, and health maintenance quality, facilities management, green space protection, operation rate, coverage rate of waters, geographical location, traffic is convenient, the service radius, square share investigated (**Table 1**).

### 2.2.2. Data Analysis Methods

This research mainly adopts Excel and SPSS software to conduct data statistics and analysis, and the analysis content mainly includes using modern mathematical statistical methods [Pescharadt & Stigsdotter, 2013-Sugiyama et al., 2014] to find the internal laws of the survey data and find problems. 1) Descriptive statistical analysis: calculate the score value of each survey item. Through the horizontal comparison of project scores, this paper analyzes the basic evaluation of users on various aspects of campus public space construction. 2) Correlation analysis: the correlation coefficient is used to measure the closeness between variables, and the factor with the highest correlation with the overall satisfaction of

**Table 1.** Descriptive analysis of public space user satisfaction survey.

	The natural environment		Human environment			Supporting facilities		
	Air freshness	Cleanliness of water	Regional culture	Local characteristics	Construction area	Arrangement of resting place	lighting	Density of public toilets
<b>Very satisfied</b>	0.33	0.19	0.28	0.33	0.36	0.24	0.13	0.15
<b>Satisfied</b>	0.24	0.20	0.15	0.19	0.25	0.28	0.15	0.20
<b>general</b>	0.28	0.45	0.36	0.27	0.21	0.23	0.29	0.44
<b>Not satisfied</b>	0.15	0.16	0.21	0.21	0.18	0.25	0.43	0.21

	Management services			The design factors					
	Hygienic maintenance quality	Operation management of supporting facilities	Green land management and protection	The rate	Water coverage	The geographical position	Convenience of transportation	The service radius	Square occupancy
	0.23	0.17	0.23	0.24	0.43	0.41	0.33	0.41	0.3
	0.22	0.22	0.31	0.47	0.27	0.33	0.25	0.3	0.23
	0.24	0.39	0.24	0.33	0.15	0.19	0.2	0.22	0.24
	0.31	0.22	0.22	0.20	0.15	0.07	0.22	0.07	0.23

campus public space can be found. 3) Regression analysis: two methods, total regression analysis and stepwise regression analysis, were adopted to establish a regression model, verify the linear relationship between a factor and overall satisfaction, and determine the importance of each factor to overall satisfaction.

### 3. Questionnaire Statistics and Data Analysis

#### 3.1. Questionnaire Statistics

From the basic information of users, it can be seen that the users of the public space in the West District are mainly students, and the education level of the customers they serve is mostly undergraduate. A total of 100 offline questionnaires were sent out, 100 were recovered, and 96 were effective, with an effective rate of 96%. 47 online questionnaires were effectively recovered, with an effective rate of 100%.

#### 3.2. Descriptive Statistical Analysis

In order to facilitate quantitative statistics, the evaluation results were assigned with 5 to 1 points from very satisfied to dissatisfied. Descriptive statistical results are shown in **Table 1**. It can be seen from **Table 1** that in the overall evaluation of the satisfaction of public space in the western campus, the choice of user satisfaction is more in the middle. Among them, in the section of natural environment, the degree of satisfaction index of air freshness is higher than that of water quality cleanliness, which is 0.33, and the proportion of “general” in the satisfaction evaluation of water quality cleanliness is 0.45. In the humanistic environment section, the proportion of “satisfied” or “very satisfied” evaluation

indexes of users on regional characteristics and building area is 0.52 and 0.61, which indicates that most users believe that the public space in this area is full of regional characteristics and covers a reasonable area, which can satisfy teachers and students. In the supporting facilities, users' dissatisfaction with lighting facilities is the highest, which is 0.43, indicating that users generally reflect the problem of less lighting facilities in public space. In the management of the public space service evaluation, utilization and health maintenance is both score is low, to illustrate the two aspects of the problem is prominent, this accords with the research observed the situation, especially the new Kyushu around lake (square) before Yifu library public space, it is dark in the evening, night lighting is lack, To use the area of the students brought a lot of inconvenience. In the design factor section, the cumulative results of "satisfied" or "very satisfied" indexes of water coverage, geographical location, transportation convenience, service radius and square occupancy are all greater than 0.5, which indicates that the public space in the western region has a reasonable site selection, convenient transportation and moderate service scope. The ecological function is good and the square covers an area that can also meet the needs of teachers and students.

### 3.3. Correlation Analysis

The correlation coefficient used in this analysis is Pearson correlation coefficient, which measures the degree of linear correlation between two variables. The symbol in front of the correlation coefficient represents the direction of correlation, and its absolute value represents the degree of correlation. The larger the correlation coefficient is, the stronger the correlation is [Su, 2001]. The correlation analysis results between the overall satisfaction of the public space in the West District of Southwest University of Science and Technology and various projects are shown in **Table 2**. As can be seen from **Table 2**, all items are significantly correlated with the overall satisfaction, indicating that the design of this questionnaire is reasonable and the evaluation results are scientific and reasonable, which can better reflect the actual situation. Among them, the most relevant items are the use purpose of B3, the improvement of Central Lake in B5, and the improvement of Colorful Pillar Square in B7, indicating that in the analysis of the correlation of this part, these items have the greatest influence on the overall evaluation. In addition, this study also analyzed the correlation between the basic data of the respondents (including gender, age, educational background) and each evaluation item. The results show that there is no significant correlation between the evaluation scores and the basic characteristics of the surveyed population, that is, there is no significant difference between the evaluation of different characteristics of the population.

### 3.4. Regression Analysis

Through regression analysis, the mathematical relationship model (**Table 3**) between independent variable (evaluation index) and dependent variable (overall evaluation value) was established in this study to determine the close degree

**Table 2.** Correlation analysis of public space user satisfaction survey.

		concept	type	purpose	usage	Center lake	Kyushu lake	Colorful column square	The overall evaluation	problem
Public space concept	Pearson correlation	1	-0.146	-0.047	0.025	0.017	0.117	0.122	-0.020	0.067
	Number of significant (double-tailed)		0.161	0.653	0.808	0.871	0.267	0.250	0.845	0.516
	cases	97	94	94	97	96	92	91	97	95
Types of Public Space	Pearson correlation	-0.146	1	0.074	-0.001	-0.027	-0.052	-0.046	0.018	0.179
	Number of significant (double-tailed)	0.161		0.479	0.993	0.797	0.627	0.668	0.866	0.088
	cases	94	94	93	94	93	89	88	94	92
purpose	Pearson correlation	-0.047	0.074	1	-0.132	0.268**	0.010	0.108	0.019	0.447**
	Number of significant (double-tailed)	0.653	0.479		0.206	0.009	0.929	0.323	0.853	0.000
	cases	94	93	94	94	93	89	89	94	92
usage	Pearson correlation	0.025	-0.001	-0.132	1	-0.030	-0.164	-0.126	0.119	-0.111
	Number of significant (double-tailed)	0.808	0.993	0.206		0.771	0.118	0.233	0.244	0.283
	cases	97	94	94	97	96	92	91	97	95
Central Lake improvement	Pearson correlation	0.017	-0.027	0.268**	-0.030	1	0.072	0.137	0.023	-0.008
	Number of significant (double-tailed)	0.871	0.797	0.009	0.771		0.498	0.197	0.824	0.924
	cases	96	93	93	95	96	91	90	95	94
Improvement of Jiuzhou Lake	Pearson correlation	0.117	-0.052	0.010	-0.164	0.072	1	0.317**	-0.190	-0.033
	Number of significant (double-tailed)	0.267	0.627	0.929	0.118	0.498		0.003	0.070	0.755
	cases	92	89	89	92	91	92	87	92	91
Colorful column square	Pearson correlation	0.122	-0.046	0.106	-0.126	0.137	0.317**	1	0.019	0.076
	Number of significant (double-tailed)	0.250	0.668	0.323	0.233	0.197	0.003		0.855	0.475
	cases	91	88	89	91	90	87	91	91	90
Overall satisfaction evaluation	Pearson correlation	-0.020	0.018	0.019	0.119	0.023	-0.190	0.019	1	0.042
	Number of significant (double-tailed)	0.846	0.866	0.853	0.244	0.824	0.070	0.855		0.688
	cases	97	94	94	97	96	92	91	97	95
problem	Pearson correlation	0.067	0.179	0.447**	-0.111	-0.008	-0.033	0.076	0.042	1
	Number of significant (double-tailed)	0.516	0.088	0.000	0.283	0.942	0.755	0.475	0.688	
	cases	95	92	92	95	94	91	90	95	95

\*\*At the 0.01 level (double-tailed), the correlation was significant.

**Table 3.** Regression analysis of public space user satisfaction survey.

model	R	R <sup>2</sup>	R <sup>2</sup> after adjustment	Error in standard estimates	The transformation of R <sup>2</sup>	F variation	Degree of freedom 1	Degree of freedom 2	Change in significance F
1	0.265 <sup>a</sup>	0.070	-0.094	0.420	0.070	0.429	12	68	0.947

<sup>a</sup>Predictive variables: (constant); B12; B6; A4; B7; A2; B1; A3; B5; B8; A1; B3; B2.

of each variable and dependent variable, and to distinguish important factors from secondary factors. Total regression method and stepwise regression method were mainly applied. The full regression equation established based on the questionnaire data is as **Table 3**.

**(Model Summary)**

$$\begin{aligned}
 Y = & -0.209 + 0.047X_1 + 0.041X_2 + 0.143X_3 + 0.239X_4 + 0.033X_5 \\
 & - 0.012X_6 - 0.007X_7 - 0.063X_8 + 0.086X_9 + 0.184X_{10} \\
 & + 0.03X_{11} + 0.054X_{12} + 0.089X_{13} + 0.082X_{14} + 0.162X_{15}
 \end{aligned}
 \tag{1}$$

The stepwise regression equation is as follows:

$$y = 0.881 + 0.682X_4 + 0.229X_{10} + 0.228X_{15} + 0.16X_3
 \tag{2}$$

Through the above two methods of regression analysis, we can see that A4 utilization situation, C3 maintenance management and C8 lighting service infrastructure of public space, such as the distribution of A3 safety facilities of public space overall satisfaction is the most important factor, that is to say, attention should be paid from the above several aspects to improve satisfaction.

(ANOVA <sup>a</sup> )					
Model	Sum of squares	Degrees of freedom	The mean square	F	significant
Return	0.907	12	0.076	0.429	0.947 <sup>b</sup>
1 residual	11.982	68	0.176		
Total	12.889	80			

<sup>a</sup>Dependent variable: B10. <sup>b</sup>Predictive variable: (constant); B12; B6; A4; B7; A2; B1; A3; B5; B8; A1; B3; B2.

## 4. Conclusions and Strategies

### 4.1. Overall Evaluation Results of User Satisfaction

According to the evaluation results, 10.64% people are “very satisfied”, 78.72% people are “relatively satisfied”, 8.51% people are “less satisfied” and 2.13% people are “very dissatisfied” with all the indicators of typical public space in the West District. Based on the data of “very satisfied” and “relatively satisfied”, the overall satisfaction of teachers and students to the typical public space in the new district is more than 80%. The data show that the public space in the new district can meet the needs of teachers and students on the whole, but there is still room for improvement and improvement. Through the descriptive analysis of public space satisfaction, it can be seen that the number of basic service facilities in public space is relatively small, and the satisfaction scores of distribution and

quality of basic service facilities are lower than the average score of overall satisfaction. The degree of satisfaction in the lighting index is also relatively low, which indicates that there are still some problems in the quantity, quality and construction distribution of lighting facilities. Through the correlation analysis of public space satisfaction, it can be seen that all the items are significantly correlated with the overall satisfaction, indicating that the design of this questionnaire is reasonable and the evaluation results are scientific and reasonable, which can better reflect the actual situation. Through the regression analysis, it can also be found that the factors that have the greatest impact on the overall satisfaction of public space include public space security facilities, lighting, landscape construction, etc. Different analysis methods show similar results, indicating that to improve the satisfaction of public space in the new district of Southwest University of Science and Technology, we should focus on the following aspects.

#### **4.2. Suggestions for Improvement of Campus Public Space**

Construction In the process of investigation on the use of university campus public space, it is found that some existing university campus public space is in good condition, carrying many campus activities, full of vitality and passion, and reaching the planning and design goals of campus public space. However, there are still some campus public Spaces that students are not satisfied with due to location distribution, functional configuration, infrastructure damage and other reasons.

First of all, from the results of the questionnaire survey, it can be seen that the service objects of the campus public space are mainly the students of the school. College students, as the main users of the public space on campus, complete their main activities such as life, study, sports, leisure and entertainment in the public space. No matter in what kind of social development conditions, university campus public space is to serve students, so in the process of planning and design, it is required to be student-oriented, everything for students; Therefore, it is suggested to strengthen the construction of students' use of power. Specific performance in: respect for students' behavioral needs, protect the basic rights and interests of students; Give full consideration to the student body, meet the use needs of students; Ensure students' right of discourse and participation, and put forward revision opinions and suggestions for the campus public space planning and design scheme.

Secondly, as the most important part of the university campus education space carrier, the university campus public space should also have a certain educational attribute. Different from traditional educational activities in classrooms and other internal Spaces, education and teaching are realized in outdoor public Spaces, and students' education and teaching should also be placed in the first place [Li, 2013]. So in the university campus in the process of the public space planning and design, be sure to clear the connotation and significance of the public space to express, want to students' influence and role, want to make the students learn the knowledge and culture, and through the spatial location selec-

tion, space form of shape, space, the selection of vegetation, space, the design of the sculpture, etc., the final realization of the public space to express the connotation and deep meaning.

Finally, as the progress of the society, the improvement of science and technology, the changing of people's living standard, part of the campus public space alienation phenomenon is inevitable, this requests us in the early stage of the planning and design in the process of building, with a forward-looking as possible dissimilation phenomenon scope of public space in campus, and proper guidance, Instead of blindly insisting on the realization of its established planning and design goals [Chen & Ye, 2009]. For example, with the development of economy and the improvement of living standard, the use of dormitory buildings on the new campus leads to the doubling of the distance to class, which makes the number of college students with cars gradually increase. Therefore, in the process of planning and designing the public space of the new dormitory buildings, problems such as parking and charging of electric cars should be taken into consideration. Space needs to be reserved for these student behaviors to meet student needs.

### 4.3. Nodules

Due to the new campus of southwest university of science and technology have sufficient weir flow channel through the, facing the fu river, so the geographical location, water area, the transportation is convenient, and the service radius was highly satisfied with most of the teachers and students in evaluation, and its "mountain, water, nest" space layout and functional structure also won everyone's favorite. Taking the new district of Southwest University of Science and Technology as the research object, this paper analyzes the influencing factors of the satisfaction of the users of the typical university campus public space, reflects on the planning and design of the existing university campus public space, and puts forward some suggestions for the improvement of the construction of the university campus public space. Although the whole research has achieved preliminary results, but there are still some shortcomings, and there are still a lot of work to be further studied.

To sum up, colleges and universities are the bases for cultivating high-quality creative talents, while the campus environment of colleges and universities is an invisible classroom, which is a comprehensive education force that affects people. Based on this, the spiritual significance of the construction of campus public space is greater than the material significance. We pay attention to and study this problem in the hope that the society can really pay attention to its value, rather than as a task to complete, and hope that college students will not be forgotten by the society.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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