

The Current Status and Renovation of Campus Space Planning under the Epidemic

Yuchen Sun^{1,a,*}

¹ *Department of Architecture, Changan University, Xi'an City, Shannxi, China*
a. 2019901386@chd.edu.cn

**corresponding author*

Abstract: The COVID-19 pandemic had a serious impact on various aspects of urban areas, such as the economy, public health, and planning, especially campuses. This article analyses the spatial use problems faced by historic universities during the pandemic, including poor dormitory environments, lack of leisure spaces, low utilization of green spaces, and unreasonable cafeteria design. To address these problems, the article proposes some corresponding suggestions. For dormitory buildings, it is recommended to activate the ground floor space for medical purposes during the pandemic and develop other functions in the post-epidemic era. For leisure spaces, the article suggests designing independent characteristic spaces from five perspectives, including park areas, fitness facilities, student activity centers, coffee shops, and libraries, to meet the requirements and different needs during the pandemic. For green spaces on campuses, it is recommended to increase interactive function for students rather than leaving them unengaged oases. For cafeteria renovation, it is suggested to increase space utilization, maintain an appropriate dining distance, create independent quarantine areas to provide separate or exclusive dining spaces and design personalized spaces to improve diners' sense of security and comfort.

Keywords: COVID-19, epidemic, campus transformation, public space

1. Introduction

The sudden outbreak of the COVID-19 pandemic in 2019 has posed a major challenge to cities. The pandemic impacts cities, including the economy, population movement, public health, planning, and social and entertainment activities. Additionally, the pandemic has a long-term impact on campuses. For example, due to the repeated outbreaks of the pandemic, schools adopted online teaching models, which made it difficult to ensure teaching quality. The school's policies of "campus closure" and "dormitory closure" led to significant problems with students' mental health, and a decline in the quality of learning, forming a negative feedback loop.

Although the pandemic has passed, many problems on campuses have been exposed, such as the homogenization of learning spaces, a lack of attention to student mental health, and uneven distribution of educational resources. Therefore, this article selects several prestigious universities, including Peking University, Sichuan University, and Nankai University, to describe their spatial planning characteristics, focusing on the impact of the pandemic on campus public spaces, analysing the causes of these problems, and proposing some renovation measures.

2. The Current Situation and Inherent Problems

Based on collecting and organizing relevant materials [1,2], we have summarized some of the problems on several prestigious universities with a long history, such as Peking University, Sichuan University, Nankai University, and Tongji University.

2.1. The Founding Year of the School

The founding year of Peking University can be traced back to 1898, the predecessor of Sichuan University can be traced back to 1896, the founding year of Nankai University can be traced back to 1919, and the founding year of Tongji University can be traced back to 1907. Due to the campuses' early establishment and old age, there may be some aging and damage issues. These buildings' historical and cultural significance may also impose limitations on campus construction.

2.2. Geographic Location

Because these universities were established early, they are mainly located in the old urban areas and central regions of cities. For example, Peking University is located in the Zhongguancun area of Haidian District, Beijing. The surrounding environment is mainly composed of residential areas and university districts. This area is one of Beijing's high-tech and education centers, with numerous scientific research institutions, universities, and enterprises nearby. The external transportation around the campus is complicated, with many main roads and highways nearby. Due to the highly concentrated facilities in the surrounding area, there can be very serious traffic congestion and busy issues, especially during rush hours, when traffic problems can become more severe.

2.3. Current Status and Inherent Issues of Spatial Planning

As campus expansion has occurred, there is a lack of uniformity in local planning. The spatial utilization in planning is unreasonable: the utilization rate of venues and buildings within the campus is relatively low, such as the cultural center near Nankai Lake at Nankai University, and some buildings in the northeast corner of the new campus area. The spatial distribution is uneven, for example, Peking University has a large campus area, but the internal spatial distribution is not balanced enough, resulting in lower space utilization rates in some areas. It may also be due to site selection issues during the founding of the universities, resulting in small campus areas that cannot meet the needs of teaching, research, and student activities.

3. Campus Space Function and Usage Issues Exposed During the Pandemic

With the onset of the pandemic, there have been changes in the flow of people on campus, teaching methods, and the lifestyles of college students. The problems on campus have become more severe, especially spatial arrangement. Based on the current characteristics of university construction, there are mainly four problems:

3.1. Poor Dormitory Building Environment

Dormitory buildings are the main public activity space for students, mainly divided into the internal dormitory and the public space of the dormitory building [3]. For the internal dormitory, its small scale is an unavoidable situation. It is difficult for students to maintain a suitable social distance, and prevent the spread of the epidemic. Secondly, it limits the placement of the learning hardware and software facilities. Finally, the limited social space and the monotonous communication can bring psychological pressure and fatigue.

As for the public space in the dormitory building, it is an important place for students to socialize and relax. The basic equipment of many public spaces is also relatively rudimentary. It also has a single function, and lacks various service facilities on campus, such as gyms, study rooms, and leisure areas. In addition, the ventilation system in the dormitory is not perfect. When the epidemic comes, it is impossible to update the indoor air, which can easily cause the proliferation of viruses and affect health.

3.2. The Lack of Recreational Spaces on Campus

The lack of public space on campus has a huge impact on students' social life and well-being. Students often feel negative emotions such as loneliness and pressure. In addition, the lack of public space also reduces the mutual communication between students, which has an impact on their innovation and thinking ability.

3.3. Low Utilization of Green Space

Green space is an important part of public space, but currently, in many schools, green space is mainly used for landscaping and cannot be interacted with by people. The lack of sufficient green space may also cause harm to students' physical health when they spend too much time indoors without fresh air and sunlight and have no suitable space to relax. Especially since the outbreak of the epidemic, students need sufficient social space to avoid gathering. However, if green space only serves a landscaping purpose and is not a space that people can participate in, such green space is completely wasted and increases the risk of students contracting the virus.

3.4. Unreasonable Cafeteria Design

The cafeteria is an important part of students' lives, but the original design of the cafeteria was aimed at maximizing the number of people in a limited space, resulting in a simple layout that tried to add as many dining areas as possible. This led to a small dining space and a high density of diners, which increased the risk of disease transmission. There are no separate areas in the cafeteria, making it difficult to flexibly separate quarantine areas for use during an epidemic. Some cafeterias only focus on dining conditions and space, but overlook the impact of air circulation, which also increases the risk of disease transmission.

4. Suggestions for Campus Space Transformation

The COVID-19 pandemic not only exposes issues with campus space planning, but also has a profound impact on students' physical and mental health, such as social isolation and academic pressure. Therefore, this article considers the pandemic's factors from the perspective of students' physical and mental health and provides relevant suggestions for campus space planning.

4.1. Dormitory Renovation

We learned from some existing practices [4] and adapted them to the impact of the pandemic. As the dormitory buildings lack supporting facilities and spaces in response to epidemics, we suggest adding spaces such as isolation rooms (for potentially infected students), medical rooms (for handling possible epidemic cases), protective areas (to isolate healthy and sick individuals), and independent dining halls (to provide meals for infected students) [5]. Even after the epidemic ends, these spaces can be adjusted and transformed for other uses. Isolation rooms can be converted into multifunctional activity rooms for socializing or leisure activities. Medical rooms can be transformed into student health centers, providing regular physical examinations, health consultations, and medical services.

This can better meet the health needs of students and promote the development of a healthy campus culture. Protective areas can be transformed into student activity centers, providing academic exchange, cultural experiences, innovation and entrepreneurship services, and, if conditions permit, can also add art and science exhibition halls. The independent dining hall can continue to serve as part of campus catering services, providing a wide variety of dining options for students while also reducing the flow of people in the cafeteria to avoid overcrowding.

Regarding the ventilation issue in dormitories, we recommend installing high-efficiency air purification systems or fresh air systems indoors to achieve the purpose of air purification and freshening. Additionally, we also suggest adding green design in the building, such as placing plants and creating indoor gardens, to effectively purify the air and improve indoor air quality.

4.2. Renovation of Campus Recreational Areas

There are many different recreational spaces on campus, but their functions are relatively single and generally only serve their most basic purposes. After the outbreak of the pandemic, there was a lack of flexible space to adapt to the impact of the pandemic. Therefore, this article provides some renovation methods for some of the recreational spaces on campus. A similar approach is to divide the large space into smaller spaces assigned specific functions.

4.2.1. Park Renovation

Through the research, we have found that campus green space can effectively promote student psychology [6]. So, we have mainly referenced the features of Griffith Park in Los Angeles County and put forward the following suggestions for the renovation of campus leisure areas. When renovating and constructing campus leisure areas, the width of roads could be considered to provide enough social distancing between students. This design not only avoids the gathering and congestion of people but also increases the sense of security and satisfaction of visitors during the pandemic. Secondly, it is recommended that leisure areas be open-plan, and places with entrances and exits can be relocated to less crowded intersections to avoid crowding. Finally, other public facilities in leisure areas also need to meet the minimum social distancing requirements. In necessary places, partitions and disinfection facilities can be added to reduce the spread of viruses.

4.2.2. Renovation of Fitness Facilities

We recommend setting up outdoor fitness facilities such as walking and cycling paths, sports fields, and outdoor fitness equipment on campus. These facilities encourage students to participate in outdoor sports and fitness activities and enhance their physical health. At the same time, hygiene facilities also need to be reasonably arranged and managed to maintain the cleanliness and hygiene of the entire park.

For indoor facilities, we suggest that the school open up the gym and update its facilities. The gym should not only serve physical education classes but also cater to a wider range of students. In addition to sports facilities, supporting facilities such as rest areas, lockers, and sound systems need to be set up to improve students' comfort and experience.

4.2.3. Renovation of Student Activity Center

The original student activity center was designed to provide students with various leisure and entertainment functions during their free time. However, the outbreak of the pandemic has restricted large gatherings of people, resulting in the underutilization of space in the student activity center. Except for the large performance space that cannot be used, other small spaces can be given new functions and new uses. When the isolation dormitories on campus are not enough, some small spaces in the student activity center can be transformed into temporary isolation dormitories for infected students or rest rooms for volunteers.

4.2.4. The Renovation of Small Spaces Such as Cafés

Under the impact of the pandemic, many schools are facing the situation of campus closure, and the problem of insufficient space on campus has been exposed. There is a lack of spaces for students to rest and enjoy on campus, such as cafes, convenience stores, fast food restaurants, and cat cafes. These spaces are used to enrich the daily lives of students and positively impact their daily lives and mental health, although they are not necessary spaces. These spaces have the same characteristics, with small spaces and a low concentration of people, which can enhance students' sense of happiness. We suggest that schools can use surplus space on campus, such as spaces under the dormitory building for storing sundries, idle classrooms under teaching buildings, or small spaces in open areas of the cafeteria.

4.2.5. Library Renovation

The library is an important study space for students, but due to the issues of confinement and concentration of people, the library is often a restricted area during the pandemic [7]. The main spaces of the library are the book-borrowing area and the study room. Generally, the book-borrowing area has a relatively single space, and the study room is mostly equipped with desks and chairs. Therefore, in the book-borrowing area, the spacing of browsing space should be increased, and in the study room, special seating can be used to control the distance between people, while increasing personalized space. Secondly, open doors and windows can be installed in the library to increase natural ventilation and lighting.

4.3. Increase Outdoor Activities

Due to the impact of the epidemic, people have begun to pay more attention to interaction with nature [8]. Outdoor leisure spaces on campus can take advantage of their location to organize outdoor activities and educational programs [9]. For example, more sports and cultural activities such as sketching and cycling can be organized, which can not only increase students' contact with nature but also improve their physical fitness. In addition, the school can set up semi-open grey spaces to ensure people closer to nature.

4.4. Increase Flexible Cafeteria Space

The cafeteria should not only meet the basic dining needs but also have some flexible designs [10]. The suggestions are as follows:

4.4.1. Transform Fixed Tables and Chairs into Foldable Ones

This way, in times of epidemics, they can be folded to maintain a suitable dining distance. In non-epidemic times, they can be unfolded to increase dining space.

4.4.2. Create Independent Isolation Areas and Divide the Large Space into Smaller Ones to Increase the Flexibility of the Cafeteria

During epidemics, these spaces can be used to provide separate dining areas for patients. In non-epidemic times, they can be set up as private dining spaces.

4.4.3. Design Personalized Spaces

In monotonous space with rows of tables and chairs, different areas can be created with different furniture to meet different dining needs. This ensures the distance and privacy of diners and increases their sense of safety and comfort.

5. Conclusion

This article focuses on several prestigious universities with a long history, summarizes the planning problems, and proposes some renovation measures.

The parallel problems of these universities are the aging of buildings caused by their long history, traffic congestion caused by their geographical location, and space waste caused by unreasonable space planning.

In the context of the COVID-19 pandemic, these problems have been exacerbated, exposing four issues related to space usage: poor living conditions in dormitories, a lack of leisure venues on campus, low utilization of green spaces, and inappropriate cafeteria design.

This article proposes different renovation suggestions for each of these four problems. Regarding dormitory buildings, the article suggests revitalizing their ground floors to transform them into spaces that can be used for medical purposes during a pandemic and for other functions when the pandemic ends. For leisure venues, the article proposes five perspectives, including campus parks, fitness facilities, student activity centers, cafes, and libraries. Different renovation designs are proposed for each type of space to meet the requirements during the pandemic and to fully reflect the unique value of each building. For green spaces on campus, the proposed renovation measures aim to increase interaction between students and green spaces rather than isolating green spaces. Finally, regarding cafeteria renovation, the article proposes increasing space utilization and maintaining appropriate dining distances, creating independent isolation zones to provide separate dining areas or private dining spaces, and designing personalized spaces to enhance the safety and comfort of diners.

References

- [1] Freestone R, Pullan N, Saniga A. 2021. *The making of a city campus*. *Geographical Research*. 59(1), 29-45. DOI: 10.1111/1745-5871.12439.
- [2] Losina E, Leifer V, Millham L, Panella C, Hyle EP, Mohareb AM, Neilan AM, Ciaranello AL, Kazemian P, Freedberg KA. 2021. *College Campuses and COVID-19 Mitigation: Clinical and Economic Value*. *Annals of Internal Medicine*. 174(4), 472-483. DOI: 10.7326/m20-6558.
- [3] Kaya, N. and Erkip, F. 2001. *Satisfaction in a Dormitory Building*. *Environment and Behaviour*, 33(6), 797-832. <https://doi.org/10.1177/00139160121972855>
- [4] Luzay E, Shafieva D, Zelenáková M, Petkanič Š. 2022. *Renovation of dormitory campus using the principles of sustainable development*. *IOP Conference Series: Materials Science and Engineering*. 1252(1), 012045. IOP Publishing. DOI: 10.1088/1757-899x/1252/1/012045.
- [5] Stastny SN, Asperin A, Ragan AM. 2012. *Changing an Academic Classroom into a Campus Restaurant*. *Journal of the Academy of Nutrition and Dietetics*. 112(9), A65. DOI: 10.1016/j.jand.2012.06.238.
- [6] Zhang P, He Q, Chen Z, Li X, and Ma J, 2022, *The effects of air pollution on respiratory health*, *International Journal of Environmental Research and Public Health*, 19(1), 151, DOI: 10.3390/ijerph20010151.
- [7] Leung TN, Chiu DKW, Ho KKW, Luk CKL. 2022. *User perceptions, academic library usage and social capital: a correlation analysis under COVID-19 after library renovation*. *Library Hi Tech*. 40(2), 304-322. DOI: 10.1108/lht-04-2021-0122.

- [8] Alnusairat S, Al-Shatnawi Z, Ayyad Y, Alwaked A, Abuanzeh N. 2022. *Rethinking Outdoor Courtyard Spaces on University Campuses to Enhance Health and Wellbeing: The Anti-Virus Built Environment*. *Sustainability*. 14(9), 5602. DOI: 10.3390/su14095602.
- [9] Rivera, E., Veitch, J., Loh, V. H. Y., Salmon, J., Cerin, E., Mavoa, S., Villanueva, K., & Timperio, A. 2022. *Outdoor public recreation spaces and social connectedness among adolescents Associations of children's active travel with parental work travel and neighborhood walkability*. *BMC Public Health*, 22(1), 176. DOI: 10.1186/s12889-022-12558-6.
- [10] Torjesen, I. 2022. *Covid-19: Hospital converts staff canteen into surge ward*. *UK COVID-19 vaccination: what's the evidence for extending the dosing interval*. *The BMJ*, o59. DOI: 10.1136/bmj. o59.