

# Research on the Transformation of Bottom Space in the Teaching Area of Zijingang Campus, Zhejiang University

Jia Xu

**Abstract**—There is a lot of bottom space in the teaching area of Zijingang Campus of Zhejiang University, which benefits to the ventilation, heat dissipation, circulation, partition of quiet and noisy areas and diversification of spaces. Hangzhou is hot in summer but cold in winter, so teachers and students spend much less time in the bottom space of buildings in winter than in summer. Recently, depending on the teachers and students' proposals, the school transformed the bottom space in the teaching area to provide space for relaxing, chatting and staying in winter. Surveying and analyzing the existing ways to transform, the paper researches deeply on the transformation projects of bottom space in the teaching buildings. It is believed that this paper can be a salutary lesson to make the bottom space in the teaching areas of universities richer and bring more diverse activities for teachers and students.

**Keywords**—Bottom space, teaching area, transformation, Zijingang Campus of Zhejiang University.

## I. BACKGROUND

IN Zijingang Campus of Zhejiang University, the bottom space of the teaching area is various. It is the place where students pass by when they go to class. The sunken space can be used to park bicycles and separate circulations of pedestrians and vehicles. Besides, as a kind of grey space transiting indoor and outdoor space, the bottom space helps to insert landscape and divide area of sound [1]. After classes, students and teachers often have a rest, enjoy scenery and chat here. With the development of society and diversity of campus life, the original bottom space in the teaching area cannot meet teachers' and students' requirements and aesthetical standards gradually. Recently, the school transformed a part of bottom space in the teaching area. According to the different characters, functions and requirements, there are different ways to transform different teaching buildings.

## II. ANALYSES OF EXAMPLES

### A. Glass Boxes

#### 1. Basic Information

The glass boxes refer to the spaces enclosed by glasses (Fig. 1) for relaxing, chatting and staying. The glass boxes are mainly located in the bottom overhead space of East Teaching Building Group, which are firstly used in the transformation of bottom space and can be constructed easily. Bottom overhead space has good effects to hot weather because it can ventilate and dissipate heat [2]. So it is usually seen in the south of China

where the weather is hot and humid in the whole year. Zhejiang is in the east of China where it is hot in summer but cold in winter, so teachers and students spend much less time staying in the bottom overhead space of buildings in winter than in summer. Recently, the school added some glass boxes in the bottom space of teaching buildings depending on the advices from teachers and students. The designer of this teaching group, Professor He, emphasized the utilization of communicating space. The five areas in the group are connected by a three-hundred-meter-long, six-meter-wide corridor. The bottom space of this teaching group is overhead and combined with the corridor, gardens and riverside scenery [3].



Fig. 1 Glass boxes

In the past, there were some open dessert stands in the bottom space of teaching buildings (Fig. 2), which were surrounded by tables and chairs for resting and dining.



Fig. 2 Open dessert stands

Now these dessert stands are enclosed by glasses and air conditioning (Fig. 3). Some glass boxes are big, including selling area and dining area that occupies two-floor space. Other glass boxes are small and the functions of them are simple, such as dessert stands, gyms (Fig. 4) or somewhere to

F. Jia Xu is a postgraduate student at the Department of Architecture Design, Zhejiang University, 310058 Hangzhou, Zhejiang Province, China (phone: +8618768110403; e-mail: xj126com2006@126.com).

rest (Fig. 5). After classes, teachers and students can rest, chat, dine and exercise here.



Fig. 3 New dessert stands



Fig. 4 Gyms



Fig. 5 Boxes for resting

## 2. Analyses and Comments

**Location:** The glass boxes are located in bottom space of the north-south corridor that is through the public area and forms a diverse-space activity zone. They are located on the both sides of six-meter-wide corridor. After adding these glass boxes, the bottom space became more compact and the circulation became more interesting. In the nodes of the space, the boxes leave

teachers and students space to avoid affecting the circulation (Fig. 6). The glass boxes in different places have different characters. The boxes near the riverside have wide fields of visions and the boxes near the gardens surrounded by quiet environments. However, the conditions of some glass boxes are not pleasant. For example, a glass box faces a wall straightly and closely. When people sit in the box, they will feel uncomfortable (Fig. 7).

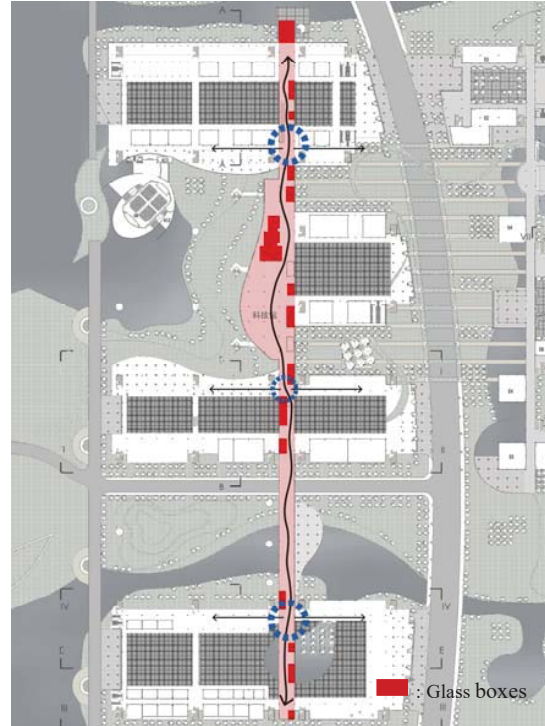


Fig. 6 Location of glass boxes



Fig. 7 People facing a wall

**Furniture Arrangement:** It is extremely important to arrange furniture in small space. It needs to be considered that how to enjoy unlimited scenery in limited space and make people comfortable rather than feeling crowded. Now in some boxes, the tables and chairs are arranged along the glass. People in the boxes face outside the glass boxes and are seen clearly by

the people pass by in the corridor (Fig. 8), which makes students and teachers lose privacies and concentrations. Environmental psychology mentions that men and the environment always achieve a balance by some kind of mutual action. When people are in the indoor environment, the performance of their explicit behaviors, people's thoughts, emotions, and other psychological factors will be affected [4]. So, the arrangement of furniture in the glass boxes should follow psychology and behavioral habits to avoid creating uncomfortable environment of the space.



Fig. 8 People faced outside the glass boxes

**Flexibility:** At present, these glass boxes are enclosed with fixed glasses with several windows (Fig. 9). In winter, the windows can be opened for ventilation but in summer, these windows cannot meet heat dissipation requirements of the glass box without air-condition. Teachers and students will be more inclined to stand in the corridor rather than sitting in the glass boxes. In summer, the advantages of the bottom overhead space should be used as much as possible. For example, the space can be enclosed by foldable glasses. When it's hot, the glasses are folded up to ventilate and dissipate heat. When it's cold, the glasses are unfolded against the cold winds.

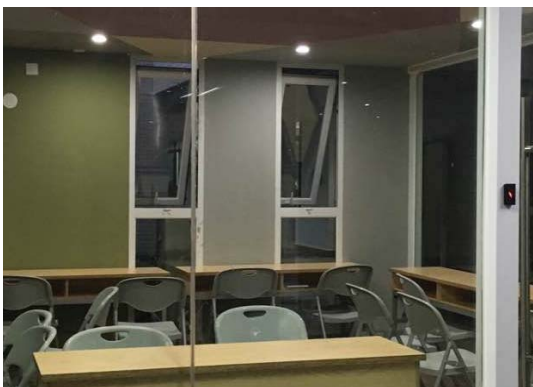


Fig. 9 Glass boxes with several small windows

**Functional Diversity:** Now most of the glass boxes are combined with the dessert stands, in which students study, chat and have teas. Because of the short lunch time, some students

have lunch and rest here. At noon, the school canteen sends the prepared meals to the stalls in the bottom space for selling to help teachers and students save the lunch time. Many students go to this small gym after school because of its accessibility and facilities. In the future, the canteen stalls, convenience stores and vending machines can be added in the glass boxes to provide lunches and snacks. Express delivery charges, fruit stalls and stationery shops can also be added to make the functions of the glass boxes more comprehensive and the service more thoughtful, bringing the teachers and students greater convenience and more choices.

## B. Large Steps

### 1. Basic Information

The school added large wooden steps where people can sit between first and second floor in East Teaching Buildings (the following is simplified as "large steps", Fig. 10). Its width is about 12 meters. On the one side, there is a 2-meter-wide stair. The height of step is 15cm which is suitable for walking. The height of the other part is suitable for sitting. Teachers and students can sit on any step and chat with friends around them.

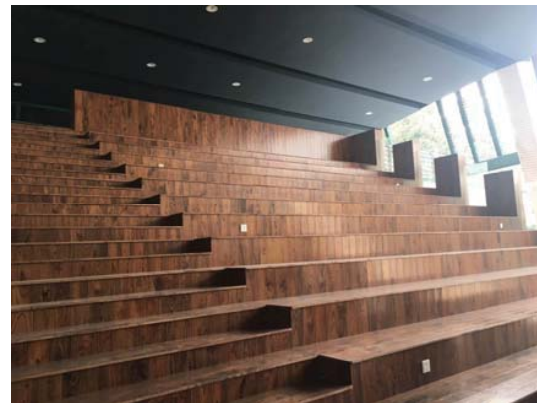


Fig. 10 Large wooden steps

### 2. Analyses and Comments

**Location:** Generally, large steps are set in high space where many people communicate. For example, in Architecture and Urban Planning College of Tongji University, there are large steps in the atrium of Red Building to provide teachers and students the place to discuss about their designs. In East Teaching Building, the large steps are located in a two-floor-high space in which they can link the first and second floor well. The big step is in close to the corridor, which can attract a large number of people. Besides, the big step is near riverside landscape, which provides a good visual enjoyment for the people who are here.

**Space and Activities:** The advantage of stepped spaces is that they do not block the sight, which can be used for open lectures, or watching performances together. However, considered that the space in front of the large steps isn't large, it is more feasible to hold small lectures. Besides, it is a problem how the space beneath the steps can be utilized. The large steps are combined with Teaching Material Center, which can take use



of the low space to store something (Fig. 11).

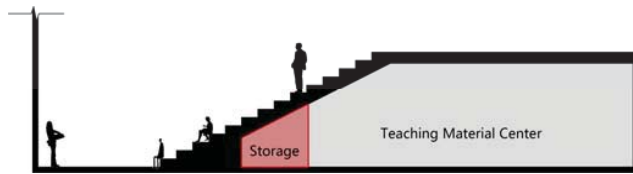


Fig. 11 Space and activities of large steps

### C. Decorations

#### 1. Basic Information

As the aesthetic requirements are getting higher and higher, teachers and students are not satisfied with the few colors and decorations in teaching buildings. For example, in the entrance hall of College of Animal Science, the security office and publicity bars were set up with wood, which creates a harmonious and warm atmosphere (Fig. 12). In the corridor at the bottom space of East Teaching Building, there is a small part of space decorating with the pink and red tiles in ceiling, wall and floor (Fig. 13). And a few different sizes, red and pink metal showcases are placed here. The enclosure in four sides will highlight this small space, bring vitality to the entire corridor and create the quality display space for exhibitions. The ceiling of the East Teaching Building is decorated with different lengths of bars and different colors of linear lights to create space for mobility (Fig. 14).



Fig. 12 Entrance hall of College of Animal Science

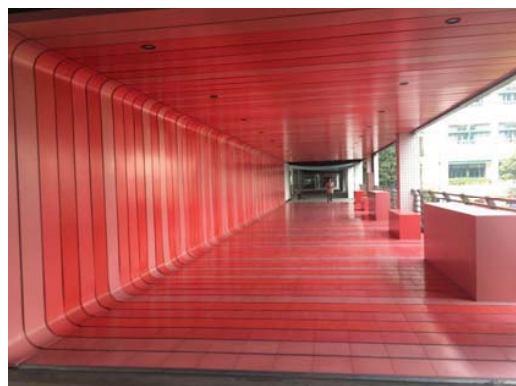


Fig. 13 Space decorating with the pink and red tiles



Fig. 14 Ceiling with linear lights

#### 2. Analyses and Comments

The characteristics and needs of the bottom space in teaching buildings are diverse. When it is the static space for displaying and communicating, the elements different from background in colors and materials and some exhibitions can be added to emphasize a certain space, which will attract people to stop, watch and communicate. When it is the dynamic space like aisles, similar and slightly changed elements can be arranged in a certain order, which will give a sense of movement [5]. It is a convenient and efficient way to use elements like colors, materials and lightings to improve the space in the transformation.

### III. CONCLUSION

The bottom space in teaching areas is the place where students' activities are extremely rich and the needs of the space are diverse. Through surveying, analyzing, and researching the ways to transform bottom space in the teaching buildings, a salutary lesson can be learned to make the bottom space in the teaching areas of universities better and bring more diverse activities to teachers and students.

### REFERENCES

- [1] Xie Chang'e, The Research on the Design of Overhead Space in College Buildings of South China, Master of South China University of Technology, 2010
- [2] Fang Zhiguo, The Research on the Design of Overhead Bottom Architecture Space, Master of Huaqiao University, 2007
- [3] Architecture Creation Magazine, The Design of East Teaching Building Group in Zijingang Campus of Zhejiang University, Shandong Science and Technology Press, 2008
- [4] Li Ma, The Influence and Application of Environmental Psychology in Interior Design, Science Information, No.18, 2008
- [5] Luan Hui, Art Design under Light Environment – the Research on the Space Creation of Light, Master of Shandong Normal University, 2013