



# Research on the Design of Indoor Facilities in University Dormitories Based on POE Theory

Tao Yang<sup>(✉)</sup> and Dandan Wang<sup>(✉)</sup>

School of Design and Art, Shenyang University of Architecture, Shenyang 110000, China  
806009741@qq.com, 420945054@qq.com

**Abstract.** With the development of the times, the demand pattern of contemporary college students is also changing. University dormitories as one of the important places for college students to live on campus, the good indoor facilities can not only provide students with a comfortable resting place, but also create a rich interaction environment for them. This thesis summarizes the changes in the design of college dormitories based on the changes in the behavioral needs of modern college students through research and analysis of college students using POE theory, and proposes corresponding design strategies.

**Keywords:** behavioral characteristics of college students · college dormitory · interior facility design · sustainable design

## 1 Introduction

According to the data released by the Ministry of Education, by 2021, there will be 537,100 schools of all levels and 289 million students. Collective living in dormitory is the main form of school in China. As a communal living environment, the dormitory has its own special characteristics. In addition to meet the basic living conditions of college students, whether it can adapt to the diverse behavioral needs of contemporary college students is an important issue that must be considered in the design [1].

Environmental psychology research found that the spatial composition of the dormitory and the quality of the environment have a subtle effect on the personality of students, and the monotonous space form and crowded dormitory space will have a negative impact on the psychological and physiological development of college students, which will lead to negative emotions such as isolation, anxiety and depression, and there may even be a trend of increased crime rate among students [2]. How to solve the housing problem of college students and provide them with a healthy and friendly environment has become an urgent issue in campus construction. Therefore, this thesis makes a field survey and research on colleges and universities through the method of post occupancy evaluation (POE) of buildings, and then focuses on the actual needs and satisfaction evaluation of students to explore the problems and design defects in use, and analyzes and summarizes the problems and deficiencies that appear in the survey results to clarify the design methods of student dormitories and make suggestions for future designs.

## 2 Concept and Role of POE Theory

Post Occupancy Evaluation (POE) is an evaluation of buildings and their environments after they have been built and used for a certain period of time, focusing on the actual use of buildings and related environments, as well as the users’ opinions on their use [3]. The principle of POE is to collect feedback information by comparing and contrasting the intended purpose of the building and planning with the actual use, and to provide a reliable and objective basis for future planning, design and architectural decisions for similar buildings and environments.

POE is mainly oriented to the building and environment, after the completion and use for a period of time, and multi-disciplinary combined to conduct a comprehensive study, the results of POE is to help architects in the design of a feedback mechanism, to provide a reliable data basis for future reconstruction or re-build, and promote the continuous improvement of design quality. Post Occupancy Evaluation (POE) can be divided into three steps: First, the purpose of the study should be made clear, the representative research objects should be selected, and the similar research documents should be read and sorted out, and the relevant materials of the research objects should be fully collected, the questionnaire is designed with the help of environmental psychology. Secondly, different users are asked to fill in the questionnaire and carry out statistics and analysis on the collected data. Finally, a comprehensive evaluation is made through the data analysis, in view of the insufficiency of the research object, this paper puts forward the optimized updating strategy (Fig. 1).

The role of the POE consists of two parts: feedforward and feedback. Feedforward technology refers to organizing the data after the survey and constructing the knowledge system of the project built. It is an integral part of the POE investigation process. The basic elements include: accumulating and organizing knowledge and forming database; updating design of buildings; pre-planning of new projects; optimization of building decisions, etc. Feedback is to evaluate and review the performance of the completed building environment in all aspects, to identify problems in use, and to propose improvements in response to the current use, and to improve the deficiencies of the building by optimizing the post-management methods, so that the building can be used as efficiently as possible. The main elements are: statistical user satisfaction survey results. A combination

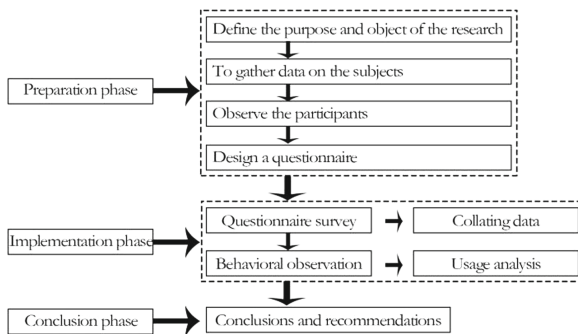


Fig. 1. Application steps of Post-occupancy evaluation (source: self-drawn by the author)

of on-site observation, standard questionnaires and interviews is used to collect users' visual feedback on the building and its environment, and interviews with designers, managers and users can be organized to obtain their systematic and considered views on the building.

### 3 Analysis of College Dormitory Housing Demand Based on POE Theory

The average age of college students in our country is 16–28 years old, and people in this period have to go through the transition from high school with a relatively simple environment to the relatively complicated university and then to the society, and from family life to campus life to social life, and the development of psychological changes is very complicated [4]. This kind of life pattern not only meets people's material needs, but also pays more attention to people's spiritual needs.

In this thesis, we used questionnaires to investigate and analyze the housing needs of students in universities in the northern region. A total of 500 questionnaires were sent out and 432 valid questionnaires were collected, including 198 boys and 234 girls. The questionnaire consists of two parts: one is the understanding of the basic information of the individual, and the other is the subjective evaluation of the individual.

#### 3.1 Basic Situation Data Analysis

According to statistics, fifty-eight per cent of students now live in six-bedroom dormitories (Table 1). However, on the question of "dormitory type preference", more than half of the students would choose a four-person dormitory under the consideration of price, area, comfort and other comprehensive reasons (Table 2). It can be seen that the current six-person dormitory can no longer meet the housing needs of the current generation of college students.

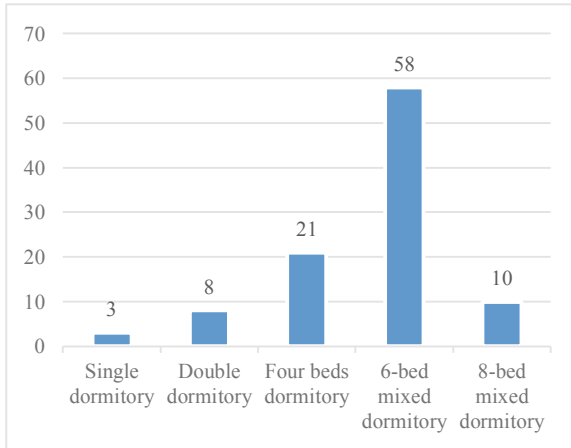
According to the survey, 51% of college students spend more than 1/2 of their whole day in the dormitory, and there are various activities in the dormitory, which means that the dormitory is becoming more and more multifunctional. In addition to the function of rest that the dormitory itself has, self-study, meeting guests, sports and entertainment have also become important activities in the dormitory (Table 3 and 4).

#### 3.2 Analysis of Subjective Evaluation Data

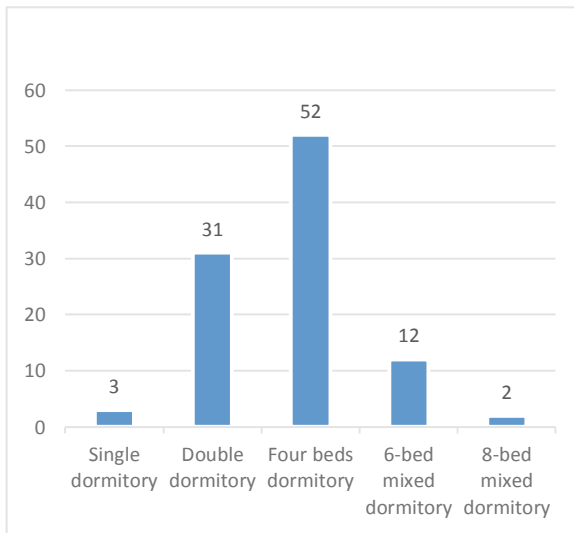
According to Laporte's "positive-negative" principle, each factor was divided into five levels and assigned a score of 2, 1, 0, -1, and -2, with 0 as the middle symmetry. The corresponding semantic scales were also divided into five measurement levels: very satisfied (rating value  $\geq 1.5$ ), more satisfied ( $0.5 \leq$  rating value  $< 1.5$ ), average ( $-0.5 \leq$  rating value  $< 0.5$ ), less satisfied ( $-1.5 \leq$  rating value  $< -0.5$ ), and very dissatisfied (rating value  $< -1.5$ ) [5].

The second part of the subjective evaluation set a total of 11 evaluation factors, and their average values were tallied into a table, i.e., a semantic distribution graph (Fig. 2).

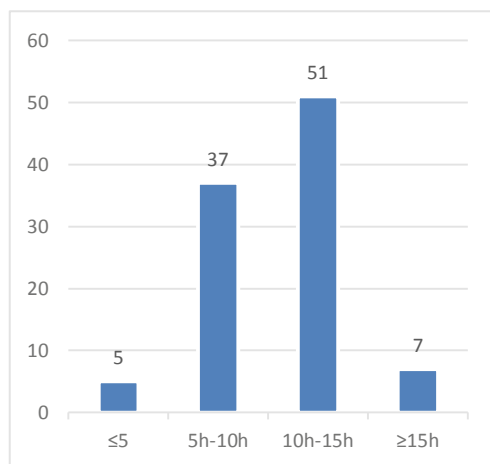
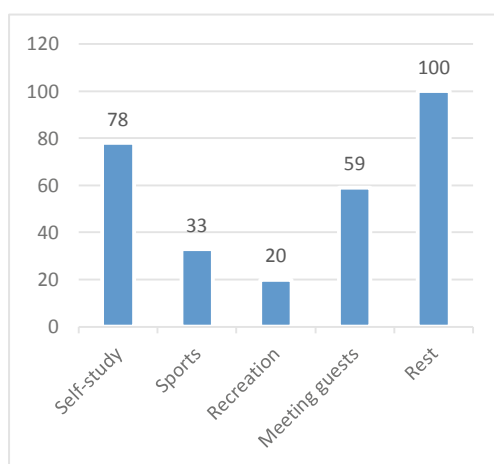
**Table 1.** Types of dormitories currently lived in



**Table 2.** Dormitory type tendency



As can be seen in the figure, most of the evaluation factors are in the negative direction, and most of the factor values are between 0 and -1, indicating that users are generally dissatisfied with student dormitories. It can be seen that dormitory is an important place for college students to live on campus, and it is also a very important component of campus infrastructure construction. However, there are many shortcomings in the design and management of college dormitories that have caused a lot of dissatisfaction among students.

**Table 3.** Average daily time of college students in the dormitory**Table 4.** Major dormitory activities (multiple choice)

The evaluation items with a mean value in the curve less than -1.5 are reasonableness of dormitory scale, and reasonableness of dormitory personal area, which indicates that personal space, and dormitory scale are currently the areas where students are most dissatisfied. The evaluation items with a rating value between -1.5 and -0.5 are satisfaction with communication space, storage space and corridor, which indicates that students are slightly dissatisfied with these two spaces at present.

## 4 Interior Design Strategies for College Dormitories that Meet the Behavioral Characteristics of College Students

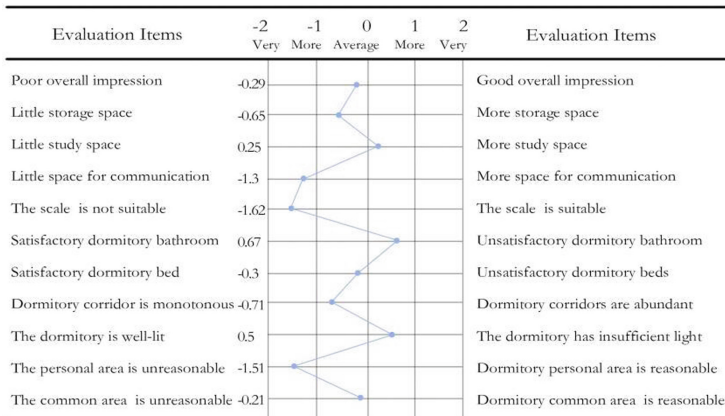
With the development of society and the gradual enrichment of service facilities, the behavior pattern of college students' dormitory is increasingly diversified and no longer single. In the design, we should consider the diversity of activities of contemporary college students and the regularity of their lives.

### 4.1 Scale-Differentiated Design of Male and Female Dormitories

While students are demanding more and more comfort and privacy in dormitories, the differences in the needs of male and female students in dormitories are also gaining attention. The design should be tailored to the differences in human scale sizes of male and female students (Tables 5 and 6). For example, the boys' dormitory uses the furniture of bed and table and the distance between the beds is set farther, and the two rooms share a set of sanitary ware and are separated, so that three people can use different sanitary ware at the same time, so as to meet the needs of the boys who require more personal space and independence; as the girls prefer company, love beauty and have more items, so the girls' dormitory can use the furniture of bunk bed, and each student has There is enough storage space and a washbasin for each student.

**Table 5.** Human height table (Data source: 《Ergonomics》)

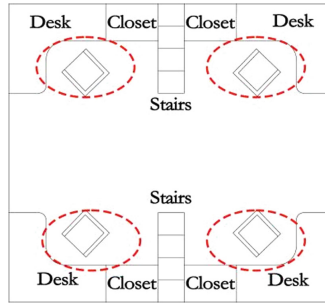
Age Percentile Part		16–17 years old			18–70 years old		
		P5	P50	P95	P5	P50	P95
Height	Male	1602	1706	1809	1591	1693	1797
	Female	1501	1590	1686	1482	1574	1673



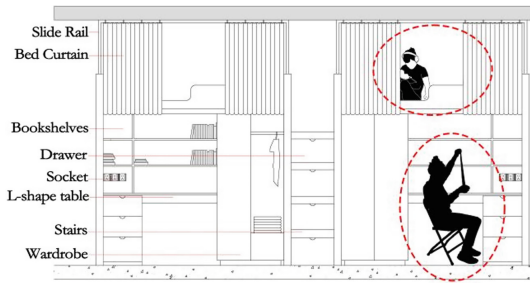
**Fig. 2.** Semantic distribution graphs (Chart source: self-drawn by the author)

**Table 6.** Body parts size and height ratio table (Data source: 《Ergonomics》)

Name	Eye height	Shoulder height	Elbow height	Knee height	Hip height	Navel height	Chest depth	Shoulder spacing	Forearm length	Spread your hands	Hands up to the highest point
Standing position	Male	0.844H	0.600H	0.267H	0.467H	0.600H	0.178H	0.222H	0.267H	1.000H	1.278H
	Female	0.933H	0.600H	0.267H	0.467H	0.600H	0.133-0.177H	0.213H	0.267H	1.000H	1.278H
Name	Eye height	Shoulder height	Elbow height	Knee height	Sitting height	Leg height	Sitting depth	Vertex height	Vertex-seating distance	Eye-sitting distance	
	Gender										
Sitting position	Male	0.567H	0.356H	0.267H	0.222H	0.300H	0.267H	0.733H	0.533H	0.467H	
	Female	0.700H	0.567H	0.267H	0.222H	0.300H	0.267H	0.733H	0.533H	0.467H	



**Fig. 3.** “L” type desk design plan (source: self-drawn by the author)



**Fig. 4.** Combined bed frame design elevation (source: self-drawn by the author)

## 4.2 Create Space for Domain and Privacy Under High Density

At present, the material level of society is highly developed, the city is crowded and huge, and the value of space is increasingly expensive. How to meet people’s needs of domain and privacy while making full use of space is a problem that designers need to pay attention to when designing.

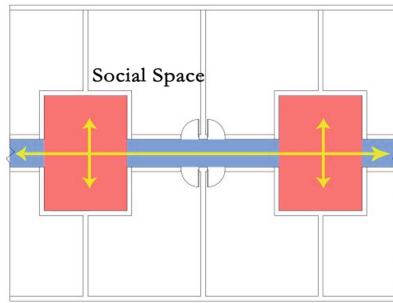
The L-shaped desk and the staircase partition form an independent personal space circle. The staircase and closet separate the students’ personal use space, and the L-shaped desk creates a sense of enclosure, satisfying the personal privacy for basic behavioral activities and increasing storage space (Fig. 3).

Set up a barrier in order to block the view of others. Through the special design of the combined bed frame-with its own curtain and slide, so that the separation between the beds, not to interfere with each other, but also to reduce the adverse effects of spontaneous behavior. This way increases the space of privacy to a certain extent and has a good effect of protecting personal privacy (Fig. 4).

## 4.3 Corridor Interaction Space Creation

In real life, there is a distance between people. Scientific distance contributes to the interaction between the two sides and makes full use of space resources. American anthropologist Dr. Edward Hall proposed the concept of interpersonal distance, which is determined according to the closeness of interpersonal relationship and behavioral





**Fig. 5.** Interaction space after turning treatment – plan (source: self-drawn by the author)



**Fig. 6.** Interaction space after turning treatment – effect (source: self-drawn by the author)

characteristics, i.e., it is divided into: close distance (within 0.45 m), individual distance (0.45–1.2 m), social distance (1.2 – 3.6 m) and public distance (more than 3.6 m) [6]. At present, most of the college dormitories in China are narrow and lengthy belt-type corridors, which will reduce people's desire to walk and stay. Widening the corridor partially or opening it partially, turning or bending it to form a certain sequence of space, turning it into a multi-segment interesting interaction space, which in turn will increase the usage rate of the corridor (Fig. 5 and 6).

## 5 Conclusion

In this thesis, POE is applied to the study of interior facilities design of college dormitories. Through literature reading, research and analysis, we explore the post-use evaluation and living needs of college student groups. The thesis summarizes the innovative environmental design strategies of differential scale design of male and female dormitories, the way to achieve domain and privacy in high-density space, and the use of turning or curving treatment to break the monotony of the strip corridor space and create interaction space. The design should also take into full consideration the development trend of college dormitories and adopt the design strategy of adapting to changes, striving to make the space have the ability to adjust, change and develop.

## References

1. Liu Guanliang. Analysis of dormitory renovation in Beijing Forestry University based on ergonomics [J]. China High-Tech, 2020(05):117–120
2. Chai Fangjian, “Research on the renovation design of existing college dormitories” [D]. Nanjing University of Technology. 2014.06
3. Tian Congxiang. Exploration on the design standard of university student dormitories - taking the student dormitory of Changjiang University as an example [J]. Sichuan building materials, 2018, 44(12):65-66.
4. Wu Entertainment. Research on the functional configuration design of student dormitories in colleges and universities [D]. Chongqing University, 2016.
5. Sun Chuanfei. Research on the optimization design of modern college student dormitory [D]. Donghua University, 2011.
6. Li Li, Chu Kaifeng. A study on the transformation of “Socially centered space” in old urban square from the perspective of environmental behavior [J]. Journal of Social Sciences, Jiamusi University, 201, 39(03):78–79 83.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter’s Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter’s Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

