Research on the space design strategy of college classrooms based on positive emotion and learning happiness experience

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Abstract: Traditional education mostly guides students' learning through teachers' words and deeds, while ignoring the spatial environment of learning is another kind of subtle education. The experiment was conducted with 66 students, 84 class hours, and 5544 action tracking data. Based on environmental psychology theory and teaching practice, this paper proposes a space design strategy for college classrooms to stimulate positive emotions and learning happiness: the Harkness round table model, which stimulates the willingness to communicate, responds to the flexible layout of different teaching situations and the ablation of classroom boundaries.

1. Introduction

The university classroom is not only the basic physical unit of education, but also the basic organizational unit. It is a learning space for college students to stay for a long time. The special classroom design affects the process of teaching and learning, also affects the behavior of students. Many studies have proved that " A learner-centred learning space can effectively support and provide various types of learning activities. Therefore, making guiding role use of the behavior of classroom space and stimulating students' positive emotional experience plays a vital role in improving the learning effect and shaping the behavior of college students.

Scholar Wang Jinghua and other studies have shown that the content of aesthetic education in colleges and universities is basically divided into two categories: one is explicit aesthetic education; the other is recessive aesthetic education. Through the edification of the campus environment, recessive aesthetic education plays an educational role for students that cannot be achieved by explicit aesthetic education.[1] Therefore, the classroom space is not only for classroom learning, but also helpful for students' hidden aesthetic education.

Improving educational space to enhance student positive behavior, using systems change approach to reconstruct the living environment and upgrade life quality, and to minimize the occurrence of problematic student behavior. Negative behavior in student learning is an applied science that should be addressed through subtle diversion rather than direct correction.

Positive emotional experience can improve students' motivation. Teaching space refers to studying students' reaction to learning through changes in the classroom.

2. Concept Definition

Students' emotion is an important factor that affects students' learning effectiveness. Positive emotional experience refers to students' curiosity, inquisitiveness, and fun in the learning process, the interest in exploring the unknown, and the desire to communicate and share. These positive emotions will make students have positive subject emotions and enhance their creativity and learning happiness, so as to stimulate more positive behaviors.

The positive behavior defined in this paper is a kind of positive behavior closely related to the teaching effect in college classroom teaching, such as students' concentration in listening, their communication with teachers, their communication and discussion with each other, and their initiative to share their own ideas. The methods that can be used to positively influence, strengthen and expand positive behavior, or to increase the systematic change of positive behavior, can be called positive emotional support.

In terms of classroom space in colleges and universities, according to the provisions of Section 2 classrooms and Article 14 of the "University Campus Planning and Design Specification", "Classrooms include various ordinary classrooms (small classes and tutoring classrooms, co-class classrooms, amphitheatre classrooms), drawing classrooms, amphitheater classrooms, graduation design and graduation thesis classrooms, language classrooms, audio-visual classrooms and auxiliary rooms. "[2]

The main objects of this study are the drawing classrooms of the Environmental Design Department of Sanda University and its adjacent public spaces. The drawing classrooms are mainly used for teachers to teach, students to make models, draw drawings, and

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communicate and report. The research uses the mapping classroom space layout as a variable and explores the differences in the guidance of students' positive behavior and interaction with teachers by the composition of classroom interior space.

3. The Influence of Learning Space on the Experience of Learning of Learning Well-Being

"We shape our buildings, and our buildings shape us" - Winston Churchill. We have learned that built spaces can affect our physical and mental health, and that specially differentiated cells in the hippocampus of our brains can adapt to the arrangement characteristics of our space. For more than seven decades, neuroscientists and psychologists have gathered enough evidence to demonstrate the power of the architectural spaces we are in to shape our behavior, yet architects often ignore the psychological impact of their designs on users. effect. This effect is especially important for college students whose physical and mental development is still in the plastic stage.

Research shows that space can not only accommodate human behavior, but also hint and guide human behavior by mobilizing human visual experience, psychological needs and other super-perceptual forms. K. Lewin, the father of social psychology, believed that individual behavior is the result of the interaction between individuals and their environment, The formula is: B=f(P, E), that is, the behavior B is a function of the individual P and its environment E.P stands for personal will; E stands for environmental impact, where the environment includes both social and physical environments; and B stands for behavior, so space guides individual behaviors one of the important means.

4. SPACE DESIGN STRATERIES FOR COLLEGE CLASSROOM TO SUPPORT POSITIVE EMOTIONAL EXPERIENCES

As a university teacher and architectural designer of the Department of Environmental Design, the author, from the theoretical teaching class, design professional tutoring class, and students' report and discussion class, through the observation and record of students' learning behavior in the process of teaching practice, has a good understanding of classroom space and students' behavior. It is hoped that through this research, classroom space design strategies that support positive student behavior will be derived.

4.1. Harkness Roundtable Model to Stimulate Willingness to Exchange

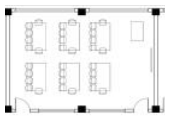
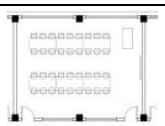
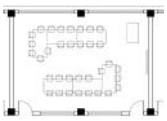
The interior space layout of the classroom is also the arrangement of classroom furniture and facilities. It is the most intuitive space element in the classroom and has the most direct impact on the behavior of students.

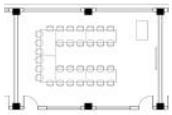
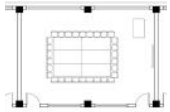
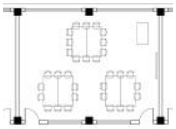
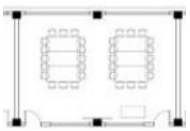
The recorded behaviors include the communication behavior between students, the communication behavior between teachers and students, and students' active sharing behavior.

Table 1. Timeframe For Research

	Experiment time and the participants			
	First semester, March 24-June 25, 2020		Second semester, September 21 - December 18, 2020	
	Class 1 Tuesday	Class 2 Thursday	Class 1 Monday	Class 2 Friday
1	2-4 lessons (3 class hours)	2-4 lessons (3 class hours)	6-8 lessons (3 class hours)	2-4 lessons (3 class hours)
2	2-4 lessons (3 class hours)	2-4 lessons (3 class hours)	6-8 lessons (3 class hours)	2-4 lessons (3 class hours)
3	2-4 lessons (3 class hours)	2-4 lessons (3 class hours)	6-8 lessons (3 class hours)	2-4 lessons (3 class hours)
4	2-4 lessons (3 class hours)	2-4 lessons (3 class hours)	6-8 lessons (3 class hours)	2-4 lessons (3 class hours)
5	2-4 lessons (3 class hours)	2-4 lessons (3 class hours)	6-8 lessons (3 class hours)	2-4 lessons (3 class hours)
6	2-4 lessons (3 class hours)	2-4 lessons (3 class hours)	6-8 lessons (3 class hours)	2-4 lessons (3 class hours)
7	2-4 lessons (3 class hours)	2-4 lessons (3 class hours)	6-8 lessons (3 class hours)	2-4 lessons (3 class hours)

Table 2. Experimental Process And Determinant Layout Diagram

	Experimental process	Determinant layout diagram
1	Arrange the classroom furniture by row-column form , record the frequency of students' positive behaviors and teachers' action tracks and time of stay	
2	Arrange the classroom furniture by long table form , record the frequency of students' positive behaviors and teachers' action tracks and time of stay	
3	Arrange the classroom furniture by L shape form , record the frequency of students' positive behaviors and teachers' action tracks and time of stay	

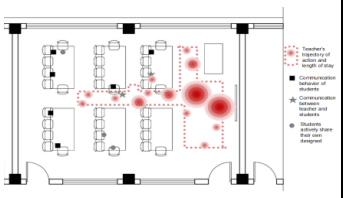
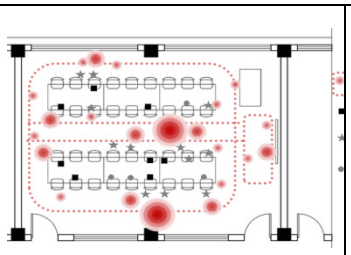
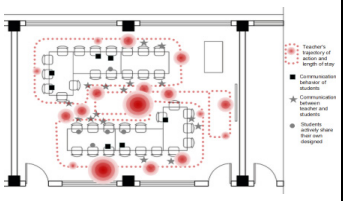
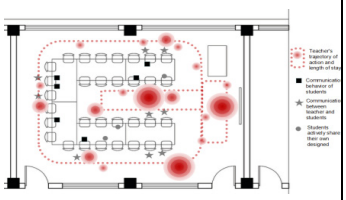
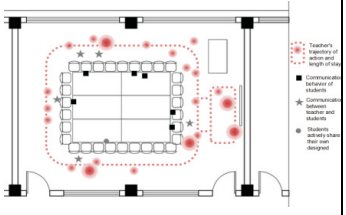
4	Arrange the classroom furniture by U shape form , record the frequency of students' positive behaviors and teachers' action tracks and time of stay	
5	Arrange the classroom furniture by centralized form , record the frequency of students' positive behaviors and teachers' action tracks and time of stay	
6	Arrange the classroom furniture by group of 10-12 people form , record the frequency of students' positive behaviors and teachers' action tracks and time of stay	
7	Arrange the classroom furniture by Group of 15-16 people form , record the frequency of students' positive behaviors and teachers' action tracks and time of stay	

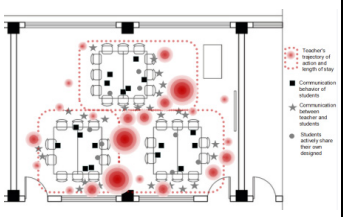
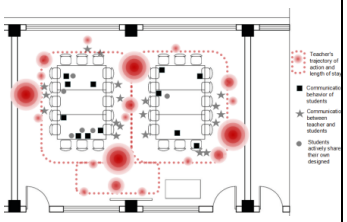
The layout of classroom tables and chairs adopts row-column form， long table form, L shape form, U shape form, centralized form, 10-12 people round table form and 15-16 people round table form， each layout method is implemented12 times in each class, and the frequency of interactive behaviors (as shown in Figure 3) is the average of the 12 times, the graphs of the two classes are superimposed, the behavioral trajectories are recorded at the same time, and the trajectory overlay graphs are drawn.

The research object is the second-year students majoring in environmental design. This experiment is based on two classes with 66 students, 33 students in each class. The experiment is carried out in the discussion class of environmental design major， and lasts for two semesters. Each class is 45 minutes, 84 class hours of student behavior were recorded per class.

The experiment lasted from March 24 to June 25, 2020, with 66 students participating and a total of 84 hours of track recording, generating a total of 5,544 data, which were plotted according to this data, all of figure draw by author.

Table 3. Model Analysis Of Experimental Process

	Schematic Diagram of Experimental Results of a Class	Analysis of experimental results
1 row-column form		Row-column form enables teacher to have a better control over the classroom, which is conducive to focusing students' attention. However, the scope of teachers' activities is limited to T-shaped areas, which can take care of limited students. It is only applicable to lecture class, not discussion class
2 long table form		The long table layout enables teacher to take care of students in a balanced way, but the inflexible layout cannot stimulate students' desire for communication and sharing
3 L shape form		The L-shaped layout creates a certain cohesive space, which gives students more sense of security and is suitable for looking at each other. The students' desire for communication is obviously increased, However, the homogeneity of this layout is poor, and the participation of students with far seats is obviously insufficient.
4 U shape form		The U-shaped layout makes it impossible for teacher to form a connected loop line in their action track, so the teacher can't take care of each student in a balanced way. Although cohesive space increases visibility, the overly rigid central symmetric layout makes students feel restrained and limits their desire for communication and sharing.
5 centralized form		The centralized layout enables students to have a good view of each other, but the long distance still hinders their communication. Although the teacher can communicate with each student along the outer circle, the students' seats are facing away from the teacher, which hinders the communication between teachers and students. The strict arrangement also makes students feel stiff and difficult to activate the classroom atmosphere.

6 Group of 10-12 people form		Group of 10-12 people form is suitable in scale and has good flexibility, which is conducive to the mutual communication between students. At the same time, the teachers can take good care of every student, and the classroom atmosphere is lively and active. It is the best layout mode in this experiment.
7 Group of 15-16 people form		Group of 15-16 people form can also achieve better classroom effects, and students have better communication and sharing performance. However, due to the large scale of grouping and poor flexibility, the frequency of positive behaviors of students in this layout is slightly less than that of groups of 10-12 people.

In order to study the impact of classroom layout on students' positive learning behaviors, the author conducted experiments in the teaching process: in two semesters, on the professional design courses of two classes, the frequency of students' positive behaviors and the activity track and stay of teachers were recorded by trying seven different layout forms of classroom space, and the behavior track of teachers and students was analyzed using a camera placed at the top of the classroom, Mark and accumulate different positive behaviors respectively, and draw the behavior trajectory diagram. (as shown in Figure 1 and 2) Assuming that other conditions remain unchanged, the higher the frequency of students' positive behaviors and the more equal the scope of teachers' care for students, the better the learning efficiency of this layout.

Under various spatial variation conditions, research has verified that the classroom placement form of the 10-12 group style close to the Harkness round table model can have the highest impact on student communication and sharing. [3] For the current college education in our country, these methods are all It belongs to a relatively small number of emission methods, and it is worth taking this as the direction of teaching reform.

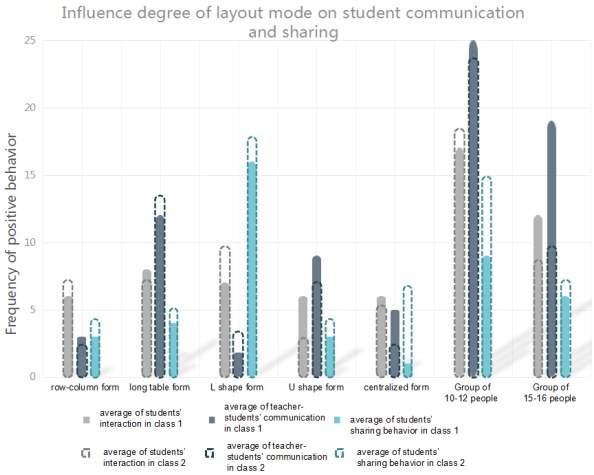


Fig. 1. Influence Of Layout Mode On Student Communication And Sharing

4.2. Flexible layout for different teaching scenarios

In the spatial concept of architecture, elastic space refers to the variability of space, and the pattern of space can be changed with the change of function or occasion. Elements such as tables, chairs, podiums, projection screens, and display walls in the classroom must have flexible and variable conditions to adapt to different teaching scenarios.

The arrangement of classroom furniture should not only meet the requirements of lecture-type classrooms, but also be able to transform into small-group discussion classrooms.

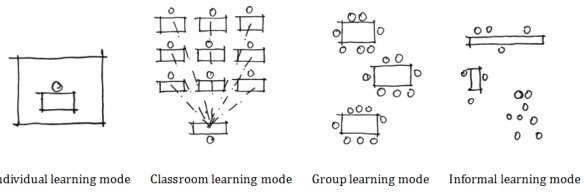


Fig. 2. Schematic Diagram Of Flexible Layout Of Classroom Learning Mode

It has been proved by theory and practice that the Harkness small-group classroom model is very suitable for flipped classrooms, combining independent learning outside the classroom with group discussions and problem discussions inside the classroom.

Breaking the four walls of traditional classrooms and flexibly changing to meet different teaching requirements is also the way to realize flexible classroom space. Use switchable transparency glass or mobile partitions to divide the interior of the classroom into different functional areas to meet the requirements of different teaching activities. Break the traditional fixed wall separation, reconstruct the function of the classroom through the change of flexible space, meet the possibility of co-class or small class, and improve the utilization rate of the classroom. Students can usually study here by themselves, and they can take classes through space transformation during class, find a "sense of belonging"

in a familiar field, improve students' creativity in thinking, and stimulate the initiative of mutual communication.

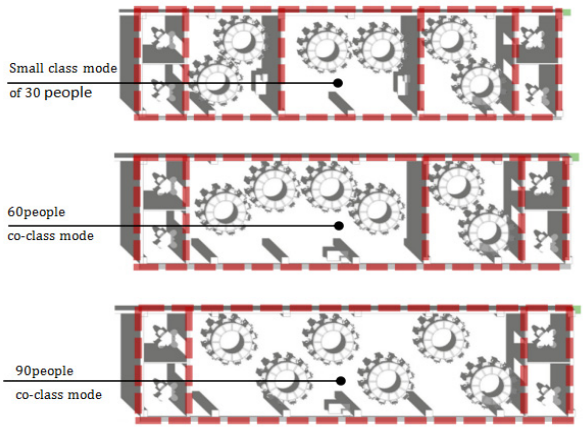


Fig. 3. Schematic Diagram Of Flexible Layout Of Classroom Learning Mode

Through flexible separation design, such as the use of glass and partitions, it can bring a sense of open space, and there are psychological factors of isolation, and at the same time, it can satisfy students' psychological switching between small groups and large groups. It is also possible to achieve the effect of mutual motivation by peeping at the dynamics of other groups. Such a partition can also bring different behavioral incentive effects.

4.3. Ablation of classroom boundaries

Research shows that friendly, informal, and relaxed interactions make people more likely to generate new inspirations and ideas. When students see other classmates studying seriously, they will enhance their own learning motivation, which is called "peer attraction and learning atmosphere". [3] Therefore, different learning spaces can be separated by transparent materials, so that the classroom space, corridors, and outdoor landscape spaces can penetrate each other. In this environment, learners will have a positive and pleasant feeling subconsciously, breaking the traditional sense of classroom closure and bring students a different sensory experience. Switching transparency or separation between classrooms, corridors, public environments and other spaces to create a sense of transparency.

In Fig. 4, the double-sided arrows of the red line show a two-way relationship. Through an open perspective, students can increase the frequency of positive behaviors.

For example, the design of the German Pavilion by the modernist architect Ludwig Mies van der Rohe at the 1929 Barcelona World Exposition, Through the division of space, various bridges from parallel, connection to partition, deconstruct the space to form various "flow spaces" of different sizes, In addition to guiding visitors, the building itself can also become a work of art, providing a variety of possibilities for the use of space. The behavior of visitors is also affected by the atmosphere of the space, which echoes the dependence of behavioral architecture theory. Students are influenced by the space inside the building. The simulation can be a reference for the transformation of spatial flow in colleges and universities.

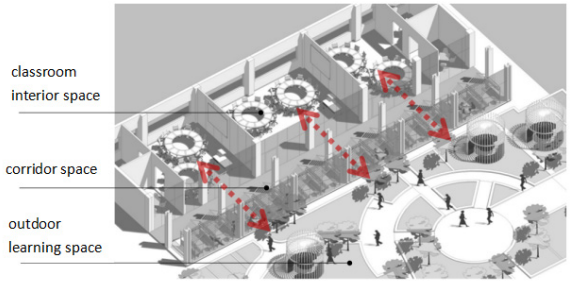


Fig. 4. Integrate Classrooms in two-way relationship

By presenting the classroom boundary in glass or other ways, students can have a better learning space, so that students can obtain isolation from each other's discussions, and it can effectively allow teachers to watch the results of each group's discussion at each node in the space. Thereby improving the learning efficiency.

5. Conclusion

5.1. Students' Positive Emotional Experience

This paper uses classroom space as the material carrier to explore the elements of learning space design that can support students' positive emotional experience: Arrangement of indoor facilities (tables and chairs), proportion, scale, separation method. Degree of space enclosure has a positive correlation with student learning, and sight communication of teaching space.

5.2. Harkness round table model

By integrating the above influencing factors of space design into a method of space design, the classroom space design strategies that can stimulate students' positive emotional experience can be summarized: the Harkness round table model that stimulates the willingness to communicate; the flexible layout for different teaching situations and the method of creating the fluidity of the teaching space and the transparency of the line of sight through the dissolving classroom boundary.

5.3. Classroom Design

The Harkness Round tables help students learn better and change their motivation through space. Classroom allows students to participate in discussions and interact with each other. Teacher can guide students to learn through interaction and enhance learning fun of classroom. This is a kind of experiment to change the psychology of space, and the effect of this experiment can be used to improve the teaching method.

5.4. Big Data For Research

How to extend the exploration of the interaction between classrooms and student behavior, there are still many scientific methods that can bring quantitative scientific data, but how to measure this complex interaction under big data, and how universities conduct spatial planning for different types of learning spaces, are all questions worthy of continuous exploration and can be used as the scope of future extension research.

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