The study of selective property of college student’s learning space

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Abstract. These days, college students study not only at places designed for learning such as libraries in colleges, but also cafes in downtown while the number of facilities for learning run by colleges is increasing. Then I have researched facilities in college and those in downtown to find selective properties of college students’ learning space. First, I found by questionnaire survey that students chose ‘3rd place’ such as cafes and fast food shops, second to their houses and libraries in college. Next, I found ‘psychological factor’ were also affected their choice. Furthermore, they studied different subjects at different places. In experiments, I researched how effectively they studied each subject at every place. The results show that I find that places you like and places where learning efficiency is good are different. They learned the least effective at ‘3rd place’ regardless of what they learned. The result of how long they kept high-level intellectual activity at each place shows that they could work on the study with more motivation at their favorite place and 3rd place. On the other hand, at the 2nd place, they could study rather effectively, but could not keep concentration and motivation for a long time. In this way, college students have 2 patterns of choosing learning space.

1. Background and purpose
In recent years, "shared space of universities that includes learning services managed by universities supporting knowledge creation" such as learning commons is spreading. It is expected that further improvement of learning commons will be advanced further in the next 3 years. However, learning places are spreading not only to places that have learning functions like schools but also to third places such as cafes and fast food stores. In this research, I focus on "learning efficiency" for each learning content and "intelligent activity degree" in time transition. I conduct research on learning places inside and outside the campus and examine the spatial selection characteristics of university students.

1.1. Previous Study on Third Place
Third place is the place defined by urban sociologist Ray Oldenburg in 1999 and he insists on the importance of informal people gathering place in urban life [1]. In addition, it is the third place that is located between the two of the individuals' homes, workplaces, and connects them and keeps balance [2]. Such a way of thinking is also spreading in college students and forms a third place in town. Among studies on college students' third place, research on Okumoto [3], which clarifies in which part and where places are likely to be formed. Kawakami [4] has research that puts the focus on college students' homes and favorite places other than university and clarifies the actual condition of the third place. One example of third place, in particular, is a cafe. There are many papers on whereabouts in the cafe space, such as research on cafe space that emphasizes communication by [2]. On the other
hand, the conventional cafe was a place intended for eating, drinking, and conversation, but pointed out that users are increasing for personal work such as work and study. As mentioned above, the use of cafes aimed at work and study, etc. is progressing, but few studies focus on the third place as a student's learning space.

1.2. Previous studies of college students' learning places
Ishizuka [5] analyzed the actual situation of use of learning commons and space composition, and gained insight to create future learning space. Megaki [6] observed the usage situation on a regular basis and described the possibility of how to use Learning Commons in the future. In the study of Learning Commons, most are research on planning and space. Endo [7] "Research on Third Place as a College Student's Learning Place" pointed out that the relationship between the decision on the decision to use third place and the relationship between third place's location and decision making is not clear.

Therefore, he conducted a questionnaire survey and an interview survey with a specific human group capable of being captured as an analysis target, captured the actual state of learning carried out nomadically, and clarified the following things.

① Process of determining learning place and its location trend
② Characteristics of consciousness of college students viewed from the reasons of nomad learning
③ Value of Third Place as a learning place in the city

As mentioned above, research has been conducted for each place, but as a learning place for college students, there are no studies that compare the selection characteristics of places, including the on-campus facilities and the off-campus facilities.

2. Experimental/Methods

2.1. Questionnaire survey
Previous studies showed that the movement of establishing Learning Commons is in the whole university and that college students use third places as learning space. Therefore, a survey was conducted for university students in Japan to grasp the actual conditions of Japanese college students' learning places. The questionnaire survey outline is shown below (Table 1)

| Purpose | Understand the actual conditions of college students' learning places |
|---------|---------------------------------------------------------------------|
| Object  | College students in Japan (86 valid responses)                      |
| Period  | September 20, 2016 - September 30, 2016                            |
| Contents| A Learning Commons B canteen C campus café D laboratory E classroom |
|         | F library G house H cafe outside campus I train J Other             |
|①      | Choose places to use for studying from the following (Multiple answers possible) |
|② In each place selected in ① the frequency of use Reason for selection Usage time zone Average learning time per one time |

In the following sentences, "first place" is "house", "second place" is "library", "third place" is "outside campus or fast food store". In addition, "First Place" is written as "1st P", "Second Place" as "2nd P", "Third Place" as "3rd P".
2.2. Interview survey

According to the questionnaire survey, it turned out that students are using 3rdP as learning space after home and library. Questionnaire survey also reveals that college students are selecting and learning multiple places, and think that there is learning content in one of the factors that select place. Therefore, we aim to conduct the interview survey for the purpose of the following 2.

① Understand the actual usage of 3rdP as a learning space in more detail.
② Reveal the location selectivity for each student's main learning content

First, only subjects using 3rdP as a learning space answer questions about 3rdP.

Next, the contents of learning mainly extracted by the student in the preliminary survey, "memorizing (memorization of words etc.)", "calculation (calculation of mathematics and chemistry etc.)", "thinking (Report, etc.)", And "creative (Idea drawing, etc.)", learning places and reasons considered to be appropriate for each study subject are asked to be answered by all subjects.

The interview survey outline is shown below (Table 2).

| Table 2. Outline of interview survey |
|--------------------------------------|
| Purpose | ① Understand the actual usage of 3rdP as a learning space in more detail. |
|         | ② Reveal the location selectivity for each student's main learning content |
| Object  | Kyoto Institute of Technology undergraduate student (32 valid responses) |
| Period  | October 25, 2016 - October 31, 2016 |
| Contents| Ask 3rdP users to ask the actual situation of use and ask all subjects to answer each place and reason why they think they can concentrate on the content of the study. |

2.3. Experiment

According to the interview survey, it became clear that the places considered able to concentrate on each learning content are different, and it was found that the type of learning content is one of the factors that are selecting the place. Psychological factors such as motivation and mood are also considered to have some influence on student's place selection.

Therefore, it aims to analyze "relation between learning efficiency by space and learning content" and "relationship between space and intellectual activity" to clarify selection characteristics of college students' learning place.

Ask the subject to answer the preference of study place of "learning overall", "memorizing", "Calculation ", "thinking", and "creative". Have the subjects take the four kinds of learning at 1stP, 2ndP, and 3rdP, to ask a subjective evaluation of spatial impression evaluation and learning efficiency.

We use the VAS (Visual Analog Scale) method to know the subject's psychological change. Placing words expressing a pair state such as "very sleepy", "very waking" at both ends of the 100 mm horizontal line segment, and the state closest to the state of the subject at the time point is placed on a line perpendicular to the vertical line. In this manner, the psychological quantity at the time of measurement is measured. Let the left end be 0 and the right end be 100. From there, the distance to the point of intersection between the vertical line drawn by the subject and the horizontal line segment is measured in millimeters, and the value is evaluated in 101 steps as the score of the psychological quantity of the subject. The outline of the experiment survey is shown below (Table 3).

| Table 3. Outline of Experimental survey |
|-----------------------------------------|
| Purpose | ① Relationship between learning efficiency for space and learning content |
|         | ② Relationship between space and intellectual activity |
| Analyze above to clarify selection characteristics of college student's study space |
| Object  | Kyoto Institute of Technology undergraduate students(59 valid responses) |
| Period  | December 1, 2016 - December 27, 2016 |
"Questionnaire about the preference of study place" to answer.

Contents subjects take the four kinds of learning (Table 4) at three places, 1stP, 2ndP, and 3rdP, to ask a subjective evaluation of spatial impression evaluation and learning efficiency.

Table 4. Learning contents

| Learning contents | 1stP(ranking) | 2ndP(ranking) | 3rdP(ranking) |
|-------------------|-------------|-------------|-------------|
| Memorizing(total 4 minutes) | 17(1) | 11(2) | 3(3) |
| Memorizing 20 daily words | | | |
| Calculation(total 7 minutes) | 10(2) | 17(3) | 4(3) |
| Junior high school level equation (sentence title and calculation problem) | | | |
| Thinking(total 15 minutes) | 12(1) | 11(2) | 8(3) |
| English translation of English class 3 grade | | | |
| Creative(total 3 minutes) | 10(2) | 4(3) | 17(1) |
| Write out associative words from specified words | | | |

3. Results and Discussion

3.1. Questionnaire survey

Students were using cafe outside the campus (34%) and learning commons (24%) after the house (65%) and the library (57%). In addition, they select and learn an average of 2.6 kinds of places. In the library, studying mainly about university lectures, while at home and cafe, in addition to that, highly studying privacy such as reading and qualification study was done. Therefore, one of the reasons for selecting a place when they study is the type of study. Students study "studying for the test" most and are doing in various places. Therefore, it was assumed that there are places considered suitable for each learning content.

3.2. Interview survey

The reason why the student selects 3rdP is that in 1stP, there is temptation such as manga and television, but people of various age group and occupation use 3rdP, and it is not too quiet like 2ndP. It was also found that "psychological factors" were affected.

From Table 5, it is found that the places where each learning content is likely to concentrate are different, and learning contents are one of the factors of location selection. 1stP is selected for "memorizing" and 2ndP is selected for "calculation" and in "creative system". 3rdP is the best choice for reasons of receiving ideas from external sources.

Table 5. Where students can concentrate on learning content

| Learning contents | 1stP(ranking) | 2ndP(ranking) | 3rdP(ranking) |
|-------------------|-------------|-------------|-------------|
| Memorizing | 17(1) | 11(2) | 3(3) |
| Calculation | 10(2) | 17(3) | 4(3) |
| Thinking | 12(1) | 11(2) | 8(3) |
| Creative | 10(2) | 4(3) | 17(1) |

Figure 1. Experiment order
3.3. Experiment

3.3.1. Relationship between space and learning efficiency.
Table 6 shows "favorite places" and "average points" by learning content. 3rdP is selected as "favorite place" as well as "place likely to concentrate" for only "creative". (Table 3). Based on the results of the hearing 3.2, I think that students are using 3rdP as a place to change their moods and learn at ease, instead of using them for learning they want to concentrate. Also from Table 6, "favorite place" and "place where learning efficiency is good" were different.

| A place of your choice by learning content | Average point by learning content |
|------------------------------------------|----------------------------------|
|                                          | 1stP(ranking) | 2ndP(ranking) | 3rdP(ranking) | 1stP(ranking) | 2ndP(ranking) | 3rdP(ranking) |
| Memorizing                              | 30(1)        | 21(2)        | 8(3)          | 14.05(3)      | 15.41(1)      | 14.36(2)      |
| Calculation                             | 15(2)        | 31(1)        | 13(3)         | 13.22(1)      | 13.14(2)      | 12.39(3)      |
| Thinking                                | 23(2)        | 24(1)        | 12(2)         | 3.23(2)       | 3.35(1)       | 3.09(3)       |
| Creative                                | 22(2)        | 8(3)         | 29(1)         | 21.03(1)      | 17.34(2)      | 15.85(3)      |

In more detail, factor analysis was conducted to find out where learning efficiency is good. The correlation between the obtained four factors and the learning efficiency was examined. The first factor named "cozy factor", the second-factor "efficiency factor", the third factor "quiet factor" and the fourth-factor "closing factor".

### Table 7. "Averages of spatial factor scores" and "Correlation between factor and learning efficiency"

| Average value of spatial factor score | Correlation between factor and learning efficiency |
|--------------------------------------|--------------------------------------------------|
|                                      | 1stP     | 2ndP     | 3rdP     | Memorizing | Calculation | Thinking | Creative |
| Cozy factor                          | 0.812    | -0.324   | -0.164   | -0.001     | -0.055      | -0.021   | .240**   |
| Efficiency factor                    | -0.51    | 0.445    | -0.379   | .177*      | -0.14       | -0.028   | -0.08    |
| Quiet factor                         | 0.386    | 0.352    | -1.09    | .164*      | 0.11        | 0.114    | 0.052    |
| Closing factor                       | 0.337    | 0.052    | -0.441   | -0.068     | -0.031      | -0.02    | 0.033    |

* Correlation coefficient is significant at 5% level (both sides)**. Correlation coefficient is significant at 1% level (both sides)

From Table 6, 1stP was chosen as a favorite place in "memorizing", but learning efficiency was the best at 2ndP. As shown in Table 7, a weak correlation was found between "learning efficiency" and "efficiency factor" of "memorizing", so it seems that it is appropriate to do it in a "quiet place likely to concentrate". In "creative", I learned that learning efficiency is the best in 1stP. Students thought that they often get ideas from outside "things" and "people" at 3rdP, but the result is that ideas are easy to emerge in places like "comfortable" like 1stP. From the above, it can be said that it is better to use a place suitable for each learning content rather than a favorite place to improve learning efficiency.

3.3.2. Relationship between space and intellectual activity.
When comparing intellectual activity degrees by location over time, the "feeling of loss of motivation" (Figure 2) always showed a low value which means state with a relatively high motivation)in the favorite place. "General vitality" (Figure 3) has a relatively high value at a favorite place and 3rdP compared with other places. It turned out that it was possible to learn with high motivation there. On the other hand, at 2ndP, "feeling of loss of motivation" (Figure 2) declined and "general vitality" (Figure 3) increased until after the second learning, but both later deteriorated sharply. 2ndP has a high score of "efficiency factor" (Table 7), it is a place where learning efficiency is relatively good, but
concentration ability and motivation do not last long, it seems that it is suitable for learning that limits time.

Figure 2. Loss of motivation
Figure 3. General vitality

4. Conclusion
Students selected various places as learning places for each learning content. Many students use 3rdP, but 3rdP was found to be poor in learning efficiency and not used for improving learning efficiency in every learning content. I learned that students could work on learning with relatively high motivation at 3rdP and their favorite places. From the above, it can be said that there are 2 patterns as a motivation for students to select a learning space. The first is a pattern that selects a place that emphasizes "learning efficiency" such as "2ndP". The second is a pattern that emphasizes "motivation" and selects "favorite place" or "3rdP". In the former, it is considered good for learning that requires concentration and last short time. In the latter case, it is considered good for learning that does not set the clearly end.

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