

## The Effect of Classroom Setting on Learning Efficiency

Xiaoqin Shi <sup>a</sup>, Jinrong Wang <sup>b, \*</sup>

Department of Foreign Languages 53#, Northwest A&F University, Yangling, Shaanxi Province  
712100, China

<sup>a</sup>sxqsxq\_shi@yahoo.com, <sup>\*</sup>, <sup>b</sup> Corresponding Author Email: wangjinrong06@163.com

### Abstract

In most perspectives, teaching methods and learning ways are important for the learners at school. Many studies focus on pedagogics and learning environment from human factors. Few studies refer to physical learning environment, like the classroom layout, which could be a factor that impacts on learning efficiency. The purpose of this study tries to find if changing the table-chair layout (TCL) of classroom affect learning efficiency and what students attitude is. After following 100 students, including 20 interviewees, for two years in two different TCL classrooms, and comparing the means of student attitude, comment and achievements by doing T-test and on-way ANOVA, some findings were gotten: 1) students more likely prefer non-regular table-chair layout (NRTCL) to regular table-chair layout (RTCL) in listening classroom. And 2) TCL really affects learning efficiency. This study is limited in listening classroom for English major students and future research may be conducted in wider range of students and other major classrooms in different schools to explore why students prefer changing TCL of classroom.

### Keywords

Table-chair layout; classroom setting; classroom environment; learning efficiency.

### 1. Introduction

How to get a good learning efficiency for students is an issue that many scholars explore. Some scholars think educational assessment can support student's learning [1, 2, 3], and they think a good assessment in some curricula would benefit to learning efficiency. Assessment and learning are important during the learning process. The good assessment can facilitate to improve teaching-learning efficiency [4]. Some scholars emphasize learning efficiency relates to teaching and learning methods. Beyond no doubt, better teaching or learning methods can result in better learning efficiency. Therefore, a lot of researchers focus on learning method. Some educators talk about learning outcomes from the perspective of human factor, such as teachers' teaching abilities, students' learning capabilities and learning climate [5, 6]. Rutter thought school climate has short-term and long-term effects on pupil's well-being whereas some scholars think learning environment should also be an important factor that affects learning efficiency. Fraser [7] said, "Student outcome might be improved by creating learning environments found empirically to be conducive to learning." Doctor Al-Qahtani [8] said that students' study approaches were influenced by their perception of their learning environment after he studied the association between study approaches and learning environment. Stephanie [9] thought the classroom learning environment impact children behavioral regulation and their achievements. Above studies about learning environment are from the perspective of humanistic environment, such as human attitude and human behavior [10, 11]. However, person's physical learning environment may also have influence on learning efficiency.

From physical environment perspective, environment can shape an individual characteristic, can affect personal mood, and could reverse the result of what happened on person [12, 13]. When people do something in different environment, they get different results, even if they do the same things [14]. Some studies show that classroom environment is a factor that affects student learning efficiency [15,

16, 17, 18]. And they found the better physical learning environment is, the more effective learning outcomes can be gotten [19], especially the classroom equipment, such as computer-assistant instruction, internet-assistant instruction, and artificial intelligence-assistant instruction. It has been proved that classroom equipment impacts on student's attentions focusing on learning when they are given an instruction more or less. For example, a lot of researchers say computer-assistant teaching really works well during the class. Now some classrooms have no pen, maker or paper, instead laptops, screens, or projectors. Of course, these assistant-learning tools facilitate teaching and make students get good learning outcomes. But some scholars also give the negative comments about these teaching assistant tools. They think student attention is distracted and they little focus on what they are really learning due to easily accessing useless information on their learning.

Instead of considering these assistant teaching tools in classroom, some scholars think classroom setting or layout can also give a help for students to grab well what teachers instruct during the class. However, studies little refers to if classroom layout, like table-chair layout (TCL), can be significant factors to facilitate teaching learning efficiency in classrooms and few studies focus on student attitude towards or comment on changing classroom TCL. In China colleges, most language listening classrooms have row-column layouts of tables and chairs, and the shape of table is rectangle. It is called regular-table-chair layout (RTCL) in China. But this layout is not good for students to take a discussion in classroom, especially in language listening classroom, while non-regular-table-chair layout (NRTCL), like circular TCL in listening classroom can motivate students to discussion. Does changing layout of classroom help students get more better efficiency? Which style of layout do students like, RTCL or NRTCL? The study tries to find these answers.

Hypothesis

Hypothesis 1. Students prefer NRTCL classroom to RTCL classroom.

Hypothesis 2. Changing regular TCL can improve learning efficiency.

## 2. Methods

The study followed 100 college students from English Major in Norwest A&F University for two years, from 2015 to 2017. 20 participants, 8 boys and 12 girls, were interviewed every semester and each of them was interviewed 4 times during two years. 100 participants, including 20 interviewees, were followed from the beginning of college to the end of sophomore year. There are four classes and four instructors (three females and one male). 25 students are in per class. They have 8 English major curricula during the first two college years and the curricula are shown in Table 1. All the listening courses are instructed in listening classrooms, equipped listening devices and speech software. Two classes are in RTCL classroom, and the other two classes are in NRTCL classroom which has octangle tables or round tables, and students are seated in a circle, instead seated row-column in RTCL classroom. In the first year, Students of Class 1&2 had classes in RTCL classroom, while Class 3&4 are in NRCT classroom. In the second year, they exchange classrooms with Class 3&4. Table 1 shows the distribution of the class in two different classroom layouts in the first and second years.

Table 1. The distributions of classes and courses in different classroom layout

The first year			The second year	
<u>Layout</u>			<u>Layout</u>	
RTCL		NRTCL	RTCL	NRTCL
class	1&2	3&4	3&4	1&2
Course	News listening, oral level 1, Comprehensive listening 1 Writing level 1		public speech, oral level 2 comprehensive listening 2 write level 2	

## 2.1 Interview Data Collection

20 participants were interviewed every semester when they are in college. That is to say they were interviewed 4 times during two years. Sometimes they were asked the same question, like “what do you think when the TCL is different? Do you think it will benefit to your learning because of changing TCL in classroom?”. Of course, they answered differently at every time. At the beginning, some girls from class 1&2 said that they are used to be seated in RTCL classroom and the classroom setting should be RTCL. They could not imagine there would be a difference between RTCL and NRTCL classrooms. They did not think changing classroom setting would be good for their learning. After moving into NRTCL classroom in the second year, they were interviewed at the 3rd and 4th time. They said they felt much closer to their classmates and teachers during the class, and they can easily watch other persons’ faces, which can make them more concentrate on what they learn. For example, students gave the following words when they were interviewed.

“When I fidget in my seat, I touch the teacher’s and classmates’ eyes easily. I blush. So, I quickly take a deep breath and concentrate on my learning.” (a girl from class 1).

“At the beginning of sitting in NRTCL classroom, I really feel uncomfortable. You know, I often feel anyone else in class could see me doing other things, like talking with other, drawing a picture, or playing cellphone. I have to stop such doing and keep normal.” (a boy from class 2)

“Usually when I feel bored in class, I am distracted from the instruction and my mind flies into sky. But in NRTCL classroom, we are seated in a circle and my classmates around me easily watch my distraction and they nudge me to give me a warn. I draw back my mind to my learning.” (a boy from class 1).

Moreover, they said they don’t feel uneasy in NRTCL classroom. They liked this layout of classroom because they really got the benefits from it. Their course achievements are a good demonstration.

“Oh, my god, I cannot believe, my oral course is improved so fast. I got B. You know, last semester, I only got C. I think it is because of such NRTCL that gives me more opportunities to talk, to speak, and to discuss.” (a girl from class 2).

“Do you believe I become smarter in NRTCL than in RTCL? What the instructors said is clearer and clearer for me and I need not waste too much time to review my lessons after class. In fact, I am not a stupid. Only if I concentrate on the class can I get good grade on my course and The NRTCL can facilitate my concentration.” (a girl from class 1).

At last, most interviewees from Class 1&2 said they more like to study in NRTCL classrooms and one boy said they don’t care what classroom setting looks like and none of them said he hate to have class in NRTCL classroom.

On the contrary, interviewees from class 3&4 which moved into RTCL classroom from NRTCL classroom in the second year, gave the different comments on the TCL from class 1&2. At the first time when they were interviewed, they said they never had a class in NRTCL classroom before. It gave them more curiosity and they thought it is not like a classroom but a meeting room. After they got used to having the class in NRTCL classroom, they said it was very convenient for them to have a face-to-face talk, discussion or argument in class. It seemed that there is no distance between students and the teachers. It seemed that all class are equal and nobody stands high above others. They more freely expressed themselves during class.

“It is amazing when I have class in NRTCL classroom. I don’t fear to be asked some question suddenly because I often get a hand from my left or right.” (a boy from class 3).

“when I am in NRTCL classroom, I don’t leave my questions after class any more. I can easily get the answer from my classmates or my teacher because they are beside me.” (a girl from class 4).

In the second years, Class 3&4 move into RTCL classroom. Most students were dissatisfied. They felt they were more likely maltreated. Because they are advanced class and got a higher score of Comprehensive Quality Assessment last year. In the last two interviews, two girls were disappointed.

They said they could not keep their good scores of their course, and they talked little during class because they often see others' backs.

"I am sad to have class in RTCL classroom. I sat in the back corner of the classroom and I cannot see my teacher and hardly hear her voice mostly. Sometimes I pick up my phone from my pocket to play involuntarily." (a boy from class 3)

"I don't think it is good for my learning in such RTCL classroom. I cannot see my classmates' faces because of tables and chairs between us when we have a discussion and I don't know what her feeling is. Sometimes I think it is boring to catch a topic for talking. I wish our class can move back into NRTCL." (a girl from class 4)

After two years, the interview data was collected and most interviewees gave the following words.

"I have never thought there are round or octangle tables in our classroom before entering college and it is different from normal classroom and I really like such NRTCL classroom." (a girl from class 3)

In a word, 10% interviewees thought it doesn't matter which TCL is in the classroom, and 90% interviewees liked to have a class in NRTCL classroom. None of them said he really hate having class in the NRTCL classroom. Table 2 shows the result of interviews about changing TCL of classroom.

Table 2. Interviewee's changing attitudes towards and comments on different TCL

years	layout	class	attitude	comments
1st	NRTCL	3&4	Novel → glad	Help learning
	RTCL	1&2	indifferent→ bored	not change, as usual
2nd	NRTCL	1&2	surprised→excited	Improve learning outcomes
	RTCL	3&4	dissatisfied→disappointed	be worse

Of course, it is not enough for proving the Hypothesis 1 by getting the result of interviews. In order to illustrate the Hypothesis 1, questionnaire data collection was conducted.

## 2.2 Questionnaire Data Collection

Questionnaire was handed out to 4 classes twice at the end of every year, respectively. Students, except 20 interviewees, consented to filling out questionnaires and sign their names and student IDs. There were some questions about students' attitudes towards changing classroom layout, especially TCL in questionnaires. Some about their comments on if changing classroom TCL would facilitate their learning. According to Semantic Difference Scale, attitude was measured by 5-point scale in which some phrases are, such as "like very much=5", "like=4", "don't care=3", "don't like slightly=2", "hate=1". Three phrases— like "help a lot =3", "perhaps help=2", and "no help=1"— are in 3-point scale measured comments. In order to know if there is any changing in their learning efficiency, students' achievements of four classes were gotten from Teaching Affairs Department. "Achievement mean" is the mean of achievements of four courses which were instructed in listening rooms in that year and the course names are shown in Table 1. Table 3 shows questionnaire data collection.

## 3. Result

### 3.1 Mean Comparison of T-Test Analysis About Attitude and Comment

Table 3 shows student attitude and comment score which are different in both RTCL and NRTCL classrooms. In the first year, Class 1&2 attitude score mean is 2.97 and comment score mean is 1.72, in RTCL classroom, but in the second year when they move into NRTCL classroom, the attitude

score is 4.32 and the comment score mean is 2.55, which are higher than those in RTCL classroom. On the contrary, in the second year, both attitude score mean and comment score mean of class 3&4 are lower than those in the first year, after they move from NRTCL to RTCL classroom. After doing T-test, attitude score is statistically significant difference between RTCL classroom and NTLC classroom ( $T_1=-8.413$ , Sig(2-tailed),  $P=.000<\alpha=0.05$ ;  $T_2=-11.358$ , Sig(2-tailed),  $P=.000<\alpha=0.05$ ) in the first and the second year, respectively. And, like attitude score, Comment score is also significant difference across TCL ( $T_1=-7.591$ , Sig(2-tailed),  $P=.000<\alpha=0.05$ ;  $T_2=-8.439$ , Sig(2-tailed),  $P=.000<\alpha=0.05$ ). However, there are no statistically significant differences of attitude score and comment score between boys and girls ( $T_1=-.862$ , Sig(2-tailed),  $P=.391>\alpha=0.05$ ;  $T_2=-1.447$ , Sig(2-tailed),  $P=.152>\alpha=0.05$ ) in both two years.

Table 3. The means of attitude and comment points and achievement on TCL changing

Table-chair layout	class	Gender (Number)	Achievement*		Attitude		Comment	
			M(m)a=	M(C)c=	M(m)a=	M(C)c=	M(m)a=	M(C)c=
			M(f)b=	SDd=	M(f)b=	SDd=	M(f)b=	SDd=
The first year								
RTCL	1&2	Male (8)	71.22	75.51	3.0	2.96	1.87	1.73
		Female (32)	76.59	8.80	2.97	.62	1.68	.55
NRTCL	3&4	Male (8)	73.47	77.72	3.87	4.24	2.0	2.6
		Female (33)	78.75	6.08	4.33	.73	2.76	.49
The second year								
RTCL	3&4	Male (8)	82.21	85.01	2.13	2.46	1.75	1.56
		Female (33)	85.69	5.21	2.55	.78	1.51	.50
NRTCL	1&2	Male (8)	84.45	84.57	3.88	4.32	2.5	2.55
		Female (32)	86.60	5.88	4.44	.69	2.56	.55

The means of attitude and comment points and achievement on TCL changing.

\*the mean of four-course achievement of students in two classes which have the same classroom layout in that year.

a M(m)=the mean of achievement of boys,

b M(F)=the mean of achievement of girls;

c M(C)=the mean of achievement of every two classes;

d SD=stander deviation.

From interview and questionnaire, Hypothesis 1 seems to be proved—students give more positive attitudes and comments in NRTCL classroom than in RTCL classroom. And they prefer having a class in NRTCL classroom.

Hypothesis 2 is also being explored by one-way ANOVA analysis as follows.

Table 3 shows that girls' achievement score is higher than boys in both NRTCL and RTCL, whether in the first year or in the second year. For example, in RTCL classroom, girls' achievement mean is 76.59 and that of boys is 71.22 in the first year. Class 3&4 achievement mean is higher than that of class 1&2. In the first year, class 1&2 have classes in RTCL classroom and the mean of achievement is 75.51, while class 3&4 are in NTRCL classroom and the achievement mean is 77.72, which is higher than class 1&2. The difference of both achievement means is 2.21. However, in the second year, although class 3&4 achievement mean is 85.01, which is little bit higher than that of class 1&2, whose mean is 84.57, the difference between class 3&4 mean and class 1&2 mean is 0.44, which is lower than that in the first year. That is to say, the gap of achievement means between class 3&4 and class 1&2 is narrow after they exchange their classroom which have two different TCL in classrooms. Moreover, after class 1&2 move into NRTCL classroom in the second year, the achievement mean

increases 9.1, which is bigger than what happen in class 3&4. Is achievement really correlate to classroom layout? Some statistical analysis is going on.

Firstly, in order to explore if the TCL is a predictor which impacts on class 1&2 achievements of two years, the one-way ANOVA analysis is done. The result is that TCL is a statistically significant factor impacting on class 1&2 two-year achievement (  $F(1, 75)=27.77$ , Sig,  $P=.000<\alpha=0.05$ ). It is also a significant factor impacting on class 3&4 two-year achievement ( $F(1, 80)=33.99$ , Sig,  $P=.000<\alpha=0.05$ ).

From ANOVA analysis, the results are gotten. TCL is really a factor that impacts on student's achievement. Students make bigger progress in NRTCL classroom than in RTCL classroom. That is to say the learning outcomes is better in NRTCL classroom than in RTCL. The Hypothesis 2 seems to be accepted.

#### 4. Discussion and Conclusion

The finding from this study suggests that students more like to have a class in NRTCL classroom than in RTCL classroom. From interviews, more students give positive attitudes and comments on having a class in NRTCL classroom. When class 1&2 moved into NRTCL classroom after one year, most of them were surprised at such TCL in the listening classroom. Little by little, they like to have a class in such classroom. On the contrary, class 3&4 had classes in NRTCL classroom in the first year and they felt novel and love NRTCL classroom. However, after they moved into RTCL classroom in the second year, they showed their dislike and hate. Class 3&4 gave more negative attitudes and comments on having a classroom in RTCL classroom. Hypothesis 1 seems to be verified. Interestingly, compared with boys, girls gave more better attitudes and comments on the NRTCL classroom and boys gave more negative attitude and comments on the RTCL classroom than girls. For example, in class 3&4, boys' attitude and comment scores are less than that of girls after class 3&4 moved into RTCL classroom. However, both attitude and comment scores of every class are not correlated to gender. From psychological perspective, even if there is a little change happening in usual environment around students, it also makes them surprised and excited, like changing TCL in classroom in the study.

The findings from the study also suggest that students' achievement score changes a lot when they move in or out from NRTCL classroom. For example, in the first year, Class 3&4, having classes in NTRCL classroom, got better achievements than Class 1&2 which were in RTCL classroom, even if their entering-college-exam scores are almost same. Obviously, NRTCL classroom gave Class3&4 more conveniently to discuss in class. And it also gave teacher more space to walk around students and clearly observe students' response to what teacher instructed. If students gave more attention to what teaches said in class, they will well grasp the main points of knowledge, and the learning outcomes will be improved a lot. So, it is like what Zheng [20] said that more active classroom atmosphere can facilitate learning outcomes. Moreover, students are more interested in the new classroom layouts, like NRTCL, which will also enhance learning outcomes. Scholar Sun [21] said interests is most important for learning efficiency. In the study, even if Class 3&4 achievement score is little higher than Class 1&2, 85.01 vs 84.57, in the second year, Class 1&2 made bigger progress than Class 3&4 after Class 1&2 moved into NRTCL classroom. In other words, having classes in NRTCL classroom gave Class 1&2 more benefits for their learning outcomes than in RTCL classroom. Table 3 also shows that girls' achievement mean is larger than boys in both two years, but there is no statistically significant difference of attitude and comment score between boys and girls. So far, NRTCL classroom can facilitate learning outcomes and Hypothesis 2 seems to be confirm. It is out of question that when students have a good attitude and comment on their learning environment, their learning outcomes will be improved a lot. It is like what Kember [22] said that positive attitude is key point for students to get good learning outcomes.

The study was done among only English major classes and limited in changing TCL of listening classroom. Further study should be done among more participants and other versatile classrooms, like

math classrooms, in which student can easily discuss face to face. Further study would also be continued to explore what if changing other classroom setting, like changing wall painting or color, or changing the distance between podium and student table. It is worthy for further study to explore some factors that impact on students' attitude towards changing classroom layout.

This study would give classroom designers or decorators some suggestions that classroom layout could be more flexible and more innovative and could facilitate student learning efficiency in some extents.

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