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## Research on the Application of PBL Teaching Method in College Table Tennis Teaching

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# Research on the Application of PBL Teaching Method in College Table Tennis Teaching

**Abstract:** In the context of higher education reform, this paper makes the corresponding teaching design and implementation according to the actual teaching practice of table tennis, combined with the core concept of PBL teaching method, and summarizes the influence of PBL teaching method on students' table tennis technical level, physical fitness and practical ability through quantitative research methods, using literature method, questionnaire survey method and teaching experiment method, and explores its application in table tennis teaching in colleges and universities.

**Keywords:** PBL pedagogy, universities, table tennis teaching, applied research

## 1 Introduction

### 1.1 Basis for topic selection

Table tennis is China's national sport, with the development of the times, the traditional teaching methods can not keep up with the needs of modern technology development, in order to better cultivate table tennis talents, to ensure the sustainable development of table tennis, we need to continue to inject new vitality, deepen the teaching reform of colleges and universities, optimize the teaching mode of table tennis, improve the learning atmosphere of table tennis classes, this is the responsibility and mission of table tennis teachers.

### 1.2 Purpose and significance of the study

In this study, experiments were designed to test whether PBL teaching method can improve the quality of table tennis teaching in colleges and universities, and to explore the deep integration of PBL teaching method

and table tennis teaching. In the context of education reform, it is urgent to optimize the teaching method of table tennis and improve the teaching quality of table tennis courses, so it is a bold attempt to implement PBL teaching method in table tennis classroom, and it is the significance of this study to explore the effect of PBL teaching method in table tennis teaching in colleges and universities, and to optimize the teaching mode of table tennis.

## 2. The connotation of PBL pedagogy

American pedagogist and psychologist Jerome Bruner proposed the discovery learning method, in which the "problem-based teaching model" is interpreted as: problem-based learning teaching, that is, problem-based teaching methods.

PBL teaching method is based on problems, students answer questions in the form of groups, group members cooperate to participate in the collection and analysis of materials, and finally after discussion to obtain the optimal solution of the problem, and the results are displayed under the organization of the teacher, so the three basic elements of PBL teaching method, students, and teachers can not operate normally.

## 3. Research objects and methods

### 3.1 Subjects of the study

This paper takes the application of PBL teaching method in college table tennis teaching as the research object.

### 3.2 Research Methodology

#### 3.2.1 Documentary Law

Through the keywords of "PBL" and "PBL Teaching Method and Physical Education" were searched by CNKI, which provided theoretical support for the writing of this paper.

#### 3.2.2 Expert interview method

Through interviews with relevant experts to determine the selection of experimental subjects, the process control of the experiment, and the interviews with the students in the experimental group one week after the end of the experiment, the subjective feelings of the students on the PBL teaching method were understood.

### 3.2.3 Teaching experiments

The experimental method is the main research method in this study, and the experimental flow is shown in the following figure:

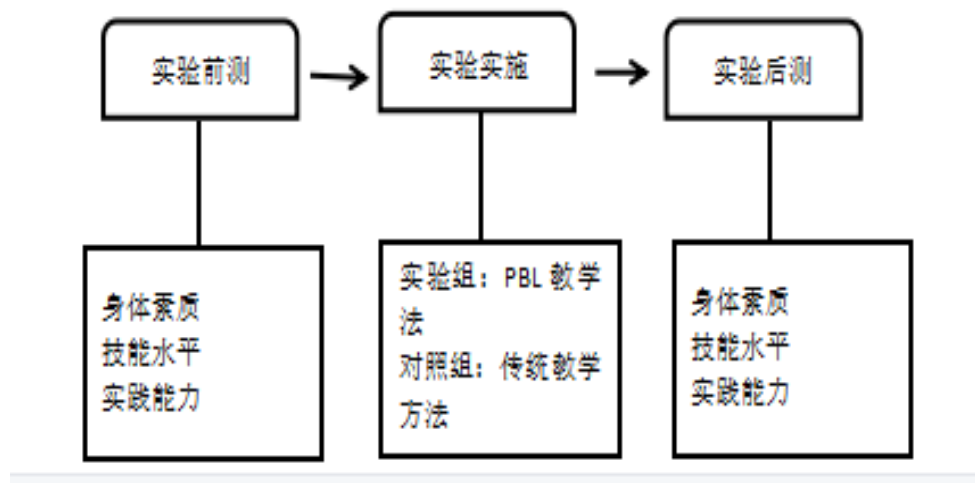


Figure 3-1 shows the experimental flow

## 4. Experimental design of PBL pedagogy in table tennis teaching

### 4.1 Purpose of the experiment

Through teaching experiments, the effects of PBL teaching method on students' table tennis technical level, problem-solving ability, practical ability, table tennis learning motivation and physical fitness were observed, and whether the PBL teaching design of the table tennis classroom was successful was verified, so as to draw corresponding conclusions.

### 4.2 Test Subjects

In this experiment, students from the 2019 physical education major of Hunan

Normal University who participated in the table tennis elective course were selected as the experimental subjects. The total number of participants in the two classes and the distribution ratio of men and women are shown in the following table:

Table 4-1 Number of test subjects and gender distribution

组别	男生	女生	总人数
实验组	15	3	18
对照组	16	2	18

#### 4.3 Location and time of the experiment

The experiment was carried out in the table tennis hall of the gymnasium of Hunan Normal University.

The experiment was conducted from September 13, 2021 to November 21, 2021, with a total of 9 weeks, 4 semester hours per week.

#### 4.4 Experimental indicators

Physical fitness: According to the "National Student Physical Health Standards" and the sports characteristics of table tennis, it was selected 50-meter run (speed quality), standing long jump (explosive quality), one-minute sliding step touch table (endurance quality), Three items are used as indicators of physical fitness.

Skill level: According to the teaching content, relevant technologies are selected as the assessment indicators of students' skill level. at

Before and after the experiment, the students in the experimental group and the control group were tested in their skills. Before the experiment, it includes: forehand attack, backhand attack

Ball; After the experiment, it included: pushing left and right attacking, rubbing the ball, pulling the downspin ball with the forehand, and sending the downspin ball.

Practical ability: The evaluation method of practical ability is set as a trial lecture, that is, let students extract a certain table tennis action as the topic of the trial lecture, and then give a trial lecture to the main examiner. The experimental group and the control group were tested for practical ability, and the evaluation dimensions



of practical ability included two dimensions: explanation ability and demonstration ability.

#### 4.5 Experimental variables and variable control

Independent variable: Teaching method. The experimental group used the PBL teaching method, and the control group used the traditional teaching method.

Variable control: The experiment adopted a single-blind method, and the instructors of the experimental group and the control group were all served by themselves. The final assessment adopts the separation of teaching and examination, and I am only responsible for the statistics of the results, not the evaluation; Before the formal test, in order to avoid the differences between the two groups of experimental subjects in various indicators and ensure the uniqueness of the independent variables, the pre-test was carried out. At the same time, avoid letting the participants know the purpose of the experiment and related details.

Dependent variables: changes in motor skill mastery, changes in physical fitness, changes in practical ability

Irrelevant variables: There are two main aspects, namely, natural social factors and personality psychological factors. Natural Society Factors include: students' extracurricular time, leave from class, etc.; Personality psychological factors include: the subjective ability of the individual Motivation, personal interest in table tennis, motivation, etc.

#### 4.6 Experimental implementation

##### 4.6.1 Teaching experiment content

Table 4-2 Teaching contents

weeks	Lessons	Hours	Teaching content
One	1	2	Review the techniques learned in the General Studies
	2	2	Review the techniques learned in the General Studies
Two	3	2	Pre-test of physical fitness and pre-test of

			technical level
	4	2	Learn to push left and attack right
Three	5	2	Review the left push and right attack
	6	2	Learn the technique of pushing and throwing sideways
Four	7	2	Review the push-and-flap technique
	8	2	Free practice of the spinning techniques you have learned
Five	9	2	Learn to serve downspin balls
	10	2	Learn to rub the ball with your backhand
Six	11	2	Learn to rub the ball with your forehand
	12	2	Review the underspin and forehand and backhand rubs
Seven	13	2	Review the underspin and forehand and backhand rubs
	14	2	Learn to pull down the ball with your forehand
Eight	15	2	Review the forehand pull-down spin ball
	16	2	Practice your downspin skills freely
Nine	17	2	Freely review the techniques you have learned this semester
	18	2	Freely review the techniques you have learned this semester
Ten	19	2	Skill level post-test
	20	2	Practical aptitude test

#### 4.6.2 The specific implementation of the experimental group

According to the teaching philosophy of PBL teaching method, the PBL teaching design is constructed to highlight the problem-oriented concept. teaching

The design idea flow is shown in the following figure:

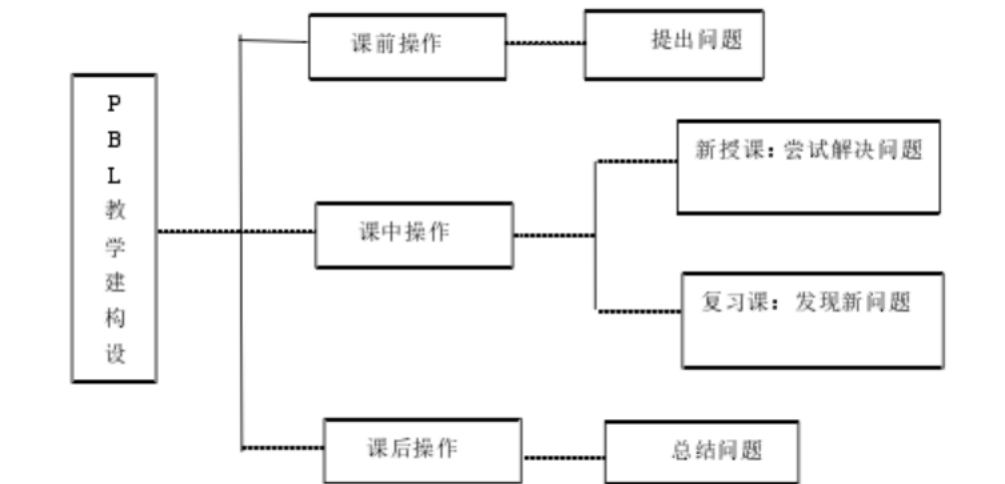


Figure 4-3 PBL Instructional Design Flow Chart

## 5. Experimental results and analysis

### 5.1 Analysis of the results of the pre-test and post-test of physical fitness

#### 5.1.1 Analysis of the pre-test results of physical fitness experiments

In order to prevent errors in the final experimental results due to physical fitness factors, the physical fitness of the two groups of experimental subjects was tested before the experiment, and the test results are shown in the following table:

Table 5-1 T-test of independent samples of physical fitness in the two groups before the experiment (n=18)

指标	实验组 ( $\bar{X} \pm S$ )	对照组 ( $\bar{X} \pm S$ )	T 值	P 值
50 米 (s)	7.43 ± 0.665	7.10 ± 0.443	1.630	0.114
一分钟滑步摸台	32.06 ± 5.066	31.06 ± 3.623	0.642	0.526
立定跳远 (m)	2.18 ± 0.231	2.21 ± 0.282	-0.288	0.775

According to the data in the above table, the P values of the three indicators of physical fitness were all greater than 0.005, indicating that there was no significant difference in the physical fitness of the two classes before the experiment, which met the experimental

requirements.

### 5.1.2 Analysis of post-test results of physical fitness experiment

After the teaching experiment, the students in the control group of the experimental group were organized to test their physical fitness again, and the results were as follows:

Table 5-2 T-test of independent samples of physical fitness in two groups after the experiment (n=18)

指标	实验组 ( $\bar{X} \pm S$ )	对照组 ( $\bar{X} \pm S$ )	T 值	P 值
50 米 (s)	7.61±0.556	7.20±0.543	0.577	0.675
一分钟滑步摸台	33.24±6.162	33.64±4.293	-0.475	0.816
立定跳远 (m)	2.28±0.314	2.30±0.414	-0.678	0.825

According to the above table, there was no significant difference between the students' three physical fitness scores after the experiment, and the classroom content was a special exercise for physical fitness, so there was little fluctuation.

Table 5-3 T-test of paired samples of physical fitness in the experimental group (n=18)

指标	实验前 ( $\bar{X} \pm S$ )	实验后 ( $\bar{X} \pm S$ )	T 值	P 值
50 米 (s)	7.43±0.665	7.61±0.556	-0.647	0.87
一分钟滑步摸台	32.06±5.066	33.24±6.162	-0.835	0.885
立定跳远 (m)	2.18±0.231	2.28±0.314	-0.919	0.913

Table 5-4 T-test of paired samples of physical fitness in the control group (n=18)

指标	实验前 ( $\bar{X} \pm S$ )	实验后 ( $\bar{X} \pm S$ )	T 值	P 值
50 米 (s)	7.10±0.443	7.20±0.543	-0.927	0.895
一分钟滑步摸台	31.06±3.623	33.64±4.293	-0.375	0.216
立定跳远 (m)	2.21±0.282	2.30±0.414	-0.821	0.792

According to the above data, although there is no significant change

between the post-test data and the pre-test data, both teaching methods are helpful to the improvement of students' physical fitness.

## 5.2 Analysis of the pre-test and post-test results of the skill level experiment

### 5.2.1 Analysis of the pre-test results of the skill level experiment

The results of the skill level test are shown in the table below:

Table 5-3 T-test of independent samples of skill level in the two groups before the experiment (n=18)

指标	实验组 ( $\bar{X} \pm S$ )	对照组 ( $\bar{X} \pm S$ )	T 值	P 值
正手攻球技评	7.98±0.430	8.00±0.334	-0.250	0.899
正手攻球达标	36.75±4.400	39.00±3.625	-1.116	0.283
反手攻球技评	7.84±0.808	7.65±0.683	0.525	0.608
反手攻球达标	43.25±3.615	41.75±3.059	0.896	0.375
左推右攻达标	14.89±4.922	13.67±5.006	0.739	0.465
发球达标	4.00±1.782	4.44±2.064	-0.691	0.494
搓球达标	6.50±2.065	6.67±2.275	-0.230	0.819
拉球达标	2.67±1.715	2.28±1.841	0.656	0.516

According to the above table, the P values of forehand attack, backhand attack and other four standard scores were all greater than 0.05, indicating that there was no significant difference in technical level between the experimental group and the control group. target

### 5.2.2 Skill level test results and analysis

At the end of the experiment, the techniques learned in this semester are tested, and the results are shown in the following table:

Table 5-4 T-test of independent samples of technical level in two groups after the experiment (n=18)

	实验组 ( $\bar{X} \pm S$ )	对照组 ( $\bar{X} \pm S$ )	T 值	P 值
左推右攻达标	30.83 ± 2.618	29.22 ± 3.282	1.628	0.113
左推右攻技评	8.16 ± 0.335	7.87 ± 0.428	2.298	0.028*
发下旋球达标	8.83 ± 1.043	8.72 ± 1.127	0.303	0.761
发下旋球技评	8.23 ± 0.301	7.99 ± 0.300	2.385	0.023*
搓球达标	13.78 ± 1.11	13.61 ± 0.916	0.490	0.627
搓球技评	8.81 ± 0.304	8.44 ± 0.335	3.442	0.002*
正手拉下旋球达标	10.44 ± 1.723	11.06 ± 1.551	-1.118	0.271
正手拉下旋球技评	7.79 ± 0.369	7.87 ± 0.312	-0.781	0.440

(注: “\*” 代表 P 值小于 0.05, 具有显著性差异)

According to the data in the above table, it can be seen that there is no significant achievement in the experimental group and the control group in terms of skill attainment

Sexual differences. And judging from the comparison of the averages, the difference between the two is not large, and both are better than before the experiment

It is a very large improvement.

### 5.3 Analysis of the results of the pre-test and post-test of practical ability

#### 5.3.1 Analysis of the results of the pre-test of practical ability experiments

In order to facilitate the comparison with the results of the post-experiment, the practical ability of the two groups of experimental subjects needs to be tested before the experiment, and the results are shown in the following table:

Table 5-5 T-test of independent samples of practical ability in the two groups before the experiment (n=18)

	实验组 ( $\bar{X} \pm S$ )	对照组 ( $\bar{X} \pm S$ )	T 值	P 值
讲解能力	37.00±1.521	37.94±1.817	0.597	0.729
组织示范能力	39.50±2.149	41.83±2.618	0.723	0.64

According to the data in the above table, the P values of the two indicators of practical ability were 0.729 and 0.64, respectively, both of which were greater than 0.05, which met the requirements of the experiment.

### 5.3.2 Analysis of the results of the practical ability experiment

Practical ability is judged by two teachers of the School of Physical Education, and students are given 20 minutes of preparation time and 10 minutes of trial lecture in the form of random questions, and the test results are as follows:

Table 5-6 T-test of paired samples of practical ability in the control group (n=18)

	实验前 ( $\bar{X} \pm S$ )	实验后 ( $\bar{X} \pm S$ )	T 值	P 值
讲解能力	37.94±1.817	38.94±2.817	0.597	0.729
组织示范能力	41.83±2.618	40.83±2.618	0.723	0.64

According to the above data, the experimental group was better than the control group in terms of explanation ability and organization demonstration ability, and there was a significant difference compared with the control group.

Table 5-7 T-test of paired samples of practical ability in the experimental group (n=18)

	实验前 ( $\bar{X} \pm S$ )	实验后 ( $\bar{X} \pm S$ )	T 值	P 值
讲解能力	37.00±1.521	41.00±2.521	-2.516	0.012*
组织示范能力	39.50±2.149	42.50±2.149	-2.779	0.000***

Table 5-8 T-test of independent samples of practical ability in two groups after the experiment (n=18)

	实验组 ( $\bar{X} \pm S$ )	对照组 ( $\bar{X} \pm S$ )	T 值	P 值
讲解能力	41.00 ± 2.521	38.94 ± 2.817	2.307	0.027*
组织示范能力	42.50 ± 2.149	40.83 ± 2.618	2.088	0.045*

According to the above data analysis, the experimental group was better than the control group in terms of explanation ability and organization demonstration ability, and the main reason was that the PBL teaching method advocated allowing students to solve problems and highlight students' abilities, which gave full play to students' creativity and avoided the fixed thinking of blindly imitating teachers' teaching methods in conventional teaching.

## 6. Conclusions and Recommendations

### 6.1 Conclusion

PBL teaching method has certain results in college table tennis teaching, which is worth promoting. Before and after the experiment, the students' physical fitness was slightly improved; In addition to learning, the students' skill level is more proficient, the students' mastery of technical movements is more refined, and the quality of completed movements has been improved; After the teaching experiment, the practical ability of the experimental group was significantly improved, which showed that the PBL teaching method was of great help to cultivate students' innovative practice.

### 6.2 Recommendations

In the early stages of PBL teaching, teachers should guide students to solve problems. In the early days of PBL implementation, To guide students in a hurry, do not know where to start, provide some



experience, and cultivate students' problem-solving thinking.

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