

# Applied Research of Two Kinds of Auxiliary Practice Equipment in Tennis Teaching

Kebao Zhang\*

School of PE, North University of China, 030051, Taiyuan, Shanxi, China

**Abstract.** Objective: To promote beginners to master tennis skills by using two independently designed tennis auxiliary exercise equipment in tennis teaching classes; Methods: The experimental method was used in this study-48 freshmen(male) without tennis learning experience, were randomly divided into two groups for teaching. The experimental group was intervened with two kinds of auxiliary exercise equipment, and the control group was intervened with traditional teaching methods; Results: The paired sample T-test of the total scores of forehand, backhand, volley and serve in the experimental group and the control group were all  $P < 0.05$ , indicating that there were significant differences between the two groups in these four data. Conclusion: The beginners with the help of two kinds of auxiliary exercise equipment are mastered better in mastering various techniques.

## 1 INTRODUCTION

### 1.1 Background

Tennis is very popular exercise event in the world. Used Auxiliary practice equipment in practicing, teaching and playing of tennis is universal. According to research, Auxiliary practice equipment not only benefit to understand technology details and movement main points for players but also improve the fresh tennis player's efficiency of batting rate and reduce the workload of teachers [1]. For example, tennis serving machine, equipment scaling, Tennis wall, exquisite ball etc [2].

There were some researches that used Auxiliary practice equipment in practicing, teaching and playing of tennis. Several researchers used specific auxiliary exercises in teaching and training teenagers and children. They change the size of the ball, the pressure, the size of the racket and the weight to assist beginners training, and make a specific model of the venue to promote students' learning. They came to the conclusion that when they trained for 5 weeks in the auxiliary training environment to slow down the speed of the ball and reduce the difficulty of hitting the ball, and then went to participate in the standard ball and standard court tests with the control group, the test results were much better [3]. Others were used to change the height of the net, the colour of the ball, the cone of vision, etc. to help students practice tennis skills. This kind of auxiliary exercise is going to make students have a visual impact, bring greater stimulation to the brain, and help the body to generate greater excitement. It is clearer when playing the ball, which is conducive to improving the accuracy of students' mastering the corresponding sports

technology, increasing the interest of sports teaching, making the forms of exercise more diversified, increasing the interest, and thus improving the efficiency of class [3]. Pellett T studied the impact of the size of the racket surface on the learning effect of college tennis beginners, and studied the change of the users' goals and self-recognition by changing the size of the racket head. The study found that hair size subjects had a high sense of self-efficacy and further improved their self-confidence [4]. In the experiment, the big racket is used to help beginners practice forehand and backhand techniques. The data of forehand and backhand skills and the self-confidence of tennis in the experimental group using this auxiliary practice method were higher than those in the control group [5]. Two researchers, Davids K and Bennett S., studied the influence of a tennis drill called practice hit on tennis beginners. This research has studied the effect of this auxiliary practice method on beginners' hitting and the standard degree of swing. It is concluded that hitting the exerciser by beginners can help fix the forehand and backhand movements; When there is no practice space, the trainer can also carry out corresponding exercises to help beginners to practice forehand and backhand skills [6]. The use of dynamic ball and static ball to carry out tennis teaching is generally just a dynamic exercise, and the static ball is raised to a certain proportion, such as the position of the forehand and backhand hitting points. The practice is to lead the racket to the hitting point. This is helpful for beginners to master the correct position of the hitting point. At the same time, different positions can be placed for beginners to practice chopping and serving. In addition, it is also helpful for beginners to use static balls to practice forehand and backhand push, so

\* Kebao Zhang: 744864568@qq.com

that they can have a clear understanding of technical details [7].

## 1.2 Objective

In view of the current situation of tennis auxiliary exercise, this research designed and developed two kinds of auxiliary exercise equipment for tennis beginners, and applied them in the teaching process of tennis courses. The equipment is cheap and easy to operate and store. In tennis teaching, we should use forehand, backhand, volley and serve techniques to make the practice more diversified. With the help of two kinds of auxiliary exercise equipment, test whether beginners can better master the essentials and details of technology, whether it can promote beginners to master the details of movements, and the technical hitting effect is better.

## 2 Method

Selection forty-eight freshmen (male) were selected from North University of China. The subjects were in good health and could ensure the time to participate in teaching experiments. 48 subjects were randomly divided into two groups, 24 in each group. The control group used traditional teaching methods for teaching, and the experimental group added auxiliary exercise equipment on the basis of traditional teaching. The venue is the tennis court of North University of China which lasts from January 2022 to June 2022. It lasts 16 weeks and 32 class hours, once a week and two class hours each time. The control group has classes on Thursday, and the experimental group has classes on Saturday. The teaching progress shall be consistent, and the students shall teach by themselves. Before the teaching experiment, all experimental objects shall be tested for physical shape, quality and special physical quality. The experiment starts under the condition that there is no obvious difference between the physical shape, physical quality and special quality of each group of students.

### 2.1 Selection of experimental indicators

According to the Implementation Measures for Ordinary Colleges and Universities (Students' Physical Health Standards) and the advice of experts, the following experimental test indicators are determined:

- Basic body shape index: height (cm), weight (kg)
- Basic physical fitness indicators: push-ups (pcs), standing long jump (m)
- Physical fitness index of tennis: meter dash (s)
- Tennis skill test: standard test, skill evaluation test and stability of forehand, backhand, volley and service skills (number of successful players)

### 2.2 Evaluation methods and standards

Number each group of students 1-48, which is helpful for the statistics of the experimental process. The experiment conducted a specific examination on the

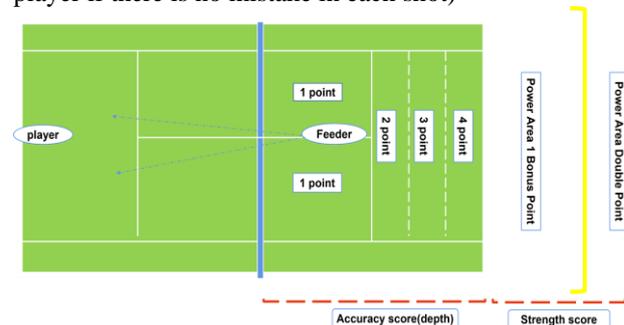
subjects' various skills. It mainly includes the evaluation of technical actions (30%) and technical compliance (70%). The test techniques are forehand, backhand, serve and volley. Two examiners are responsible for reporting the two scores, and two recorders are responsible for recording.

#### 2.2.1 Score Rules

- **Accuracy score** that according to the position of the return point in the singles area, from shallow to deep that tennis net to baseline, remarking 1-point area, 2-point area, 3-point area, 4-point area showed (**Figure 1**), such as If the ball falls in the 1 Point Area but the second bounce does not fall in the reward area, 1 point will be obtained)

- **Strength score** (one point will be added when the return point falls between the baseline and the reward line, and double score when the ball falls behind the reward line)

- **Stability score** (one point will be given to the player if there is no mistake in each shot)



**Figure 1.** Scoring Diagram of Forehand and Backhand Technical Compliance Test

#### 2.2.2 General rules of testing

- All testers must fully warm up and get ready.
  - The tester has two opportunities to practice hitting before each project starts, and then tests a certain technique.
    - Subjects have the right to reject this shot before hitting the ball. Once they hit the ball, they must score.
    - If the hitting point is pressed on the line, the higher one of the two scoring criteria will be obtained.
    - The tester has the greatest right in the whole test process and has the right to interpret the whole test.
    - The score shall be recorded immediately for each shot, and the total score of each technique shall be calculated when each item is completed.
    - The following figure is the schematic diagram of forehand technology, backhand technology and volley technology. The forehand and backhand start at the baseline, and the volley start at the midpoint of the service line from the net.
      - The service is not divided into zones and part of the inside and outside corners. The service is only tested in the first zone. 4 points for entering the zone, and additional points for stability and second placement. Detailed rules for evaluation of various technical actions:

the scope of technical evaluation includes anticipation and moving footwork, accuracy of hitting points, coordination and integrity of swing when students are doing a certain technique. Specific scoring criteria getting evaluation as follows (**Table 1**):

**Table 1.** Detailed Rules of Technical Evaluation Rules

Standard	Grade	Score
Accurately predict the coming ball, move quickly and in place, hit the ball accurately, complete and coordinated.	Excellent	9-10
students has a relatively accurate prediction ability for incoming balls. student's footwork moves slowly and is somewhat stiff but can reach the goal. Students hitting action is complete and his technical points are clear, but there are still some deficiencies.	Good	7-8
The anticipation of the coming ball was not enough, the preparation was late, the footwork was passive but could basically move in place, and the hitting action could be completed and basically smooth, but it was obviously stiff.	Qualified	4-6
No early prediction can be made for the incoming ball, the pace is scattered and slow, the swing action is incomplete, and the shot is out of bounds or invalid.	Poor	0-3

### 2.3 Usage of two kinds of auxiliary exercise equipment

#### 2.3.1 Auxiliary exerciser 1 exercise methods

The batter swings the racket, and the assistant holds the auxiliary exercise equipment 1, as follows (**Figure 2**) so that the ball is in front of the batter's side and the corresponding position of the hitting point. For example, if the batter practices forehand techniques, the auxiliary exercise equipment should be placed in front of the batter's side (right), and the batter swings the racket at the batter, and the assistant supports the racket hard, so that the racket is still after hitting the ball; In combination with footwork practice, the assistant changes the front and rear left and right positions, and the batter moves and swings the ball.

#### Purposes:

- Make learners know the fixed state of wrist at the moment of hitting;
- The best position of the hitting point;
- Relative position of body, racket face, wrist and ball;
- The direction of the strike;
- Practice tennis footwork.

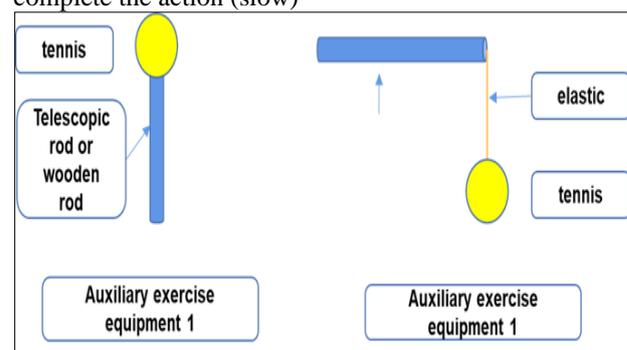
#### 2.3.2 Auxiliary exerciser 2 exercise methods

The batter swings the racket, and the assistant holds the auxiliary training equipment 2 so that the ball is in front of the batter's side. If the batter practices backhand

techniques, the auxiliary training equipment should be placed in front of the batter's side (left). The batter swings the racket at the batter, and the assistant ensures that the auxiliary training equipment does not surround the batter after the stroke, in combination with footwork practice, the assistant changes the front and rear left and right positions, and the batter moves and swings the ball.

- Make learners know the fixed state of wrist at the moment of hitting;
- The best position of the hitting point;
- Relative position of body, racket face, wrist and ball;
- Experience the push action after hitting;
- Practice tennis footwork.

The ball of auxiliary training equipment 1 is fixed, so the batter's swing is incomplete; The ball of auxiliary training equipment 2 is movable, and the batter can complete the action (slow)



**Figure 2.** Simple structure of two kinds of auxiliary exercise equipment

### 2.4 Comparison of teaching methods and means between experimental group and control group

The control group used traditional teaching methods and means, such as swing practice, multi ball practice, sparring practice, basic footwork practice, etc. On this basis, the experimental group used two kinds of auxiliary training equipment for swing practice, hitting practice, and basic footwork practice; But ensure that the two groups have the same practice time. The auxiliary practice form of the experimental group is interspersed with the traditional practice. The difference between the two groups is that in the experimental group, the exercise brought by the auxiliary exercise equipment has replaced some traditional exercise links.

## 3. Research result

### 3.1 Comparison and Analysis of Physical Fitness Index Test Results of Each Group

#### 3.1.1 Comparison and analysis of physical fitness index test results of each group before the experiment

Comparison and analysis of the results of physical fitness indicators of each group before the experiment.

Before the teaching experiment, the paired sample T test was conducted for the physical fitness test of the two groups. After the test, according to Table 2 for the analysis of the experimental data, the T test of the physical morphology and functional indicators of the

experimental subjects before the experiment is  $P > 0.05$ , which shows that there is no difference between the experimental group and the control group. It shows that there is no difference in physical fitness and functional indicators among the four groups.

**Table 2.** Test results and analysis of physical fitness indicators of each group before the experiment

Test index	group	mean	standard deviation	T value	P test
Height (cm)	control	172.33	6.213	2.018	$P > 0.05$
	experience	169.55	5.178		
Weight (kg)	control	62.34	3.928	0.324	$P > 0.05$
	experience	61.94	3.539		
Vital capacity (ml)	control	2779.1	546.3	0.213	$P > 0.05$
	experience	2800.5	492.6		
Push-ups (pcs.)	control	15	6.190	0.602	$P > 0.05$
	experience	15	5.072		
50m (s)	control	7.18	0.310	0.167	$P > 0.05$
	experience	7.26	0.343		
5o'clock turn back run (s)	control	18.5	0.483	0.356	$P > 0.05$
	experience	18.1	0.379		

Note:  $P > 0.05$  means no significant difference;  $P < 0.05$  indicates significant difference

### 3.1.2 Comparison and analysis of physical fitness index test results of different groups after the experiment

Comparison and analysis of the results of physical fitness indicators of each group after the experiment (**Table 3**). After the teaching experiment, the paired sample T test was conducted again for the physical fitness test of each group. Each experience group and control group do it separately. After the test, according to the table for the analysis of the experimental data, the test of the physical morphology and functional indicators of the experimental subjects before the experiment is  $P > 0.05$ , so there is no difference between the experience group and the control group. These data show that there is no difference between the traditional teaching methods

and the teaching methods using auxiliary exercises in terms of the changes of body shape and body function of the subjects. That is to say, the differences of technologies among different groups are not caused by changes in body shape and physical quality. In the experience group, the author has added two kinds of exercisers as auxiliary exercises. This exerciser has a training method that reduces the waiting time for students to practice multiple balls, and adds some amount of exercise, but the intensity is not large. It is just some auxiliary exercises of swinging, the assistance of hitting points, and short distance moving exercises. Therefore, before and after the experiment, there was no difference between groups because a group thought that the amount and intensity of exercise were different. It ensures that all data changes of subjects' bodies are consistent before and after the experiment.

**Table 3.** Comparison and Analysis of Physical Fitness Index Test Results of Each Group after the Experiment

Test index	group	mean	standard deviation	T value	P test
Height (cm)	control	172.33	6.778	1.902	$P > 0.05$
	experience	169.44	5.238		
Weight (kg)	control	62.01	3.235	0.324	$P > 0.05$
	experience	60.43	2.578		
Vital capacity (ml)	control	2993.3	346.7	0.719	$P > 0.05$
	experience	3134.5	489.9		

Push-ups (pcs.)	control	15	6.457	0.602	P>0.05
	experience	14	7.014		
50m (s)	control	7.08	0.134	0.201	P>0.05
	experience	7.01	0.459		
5o'clock turnback-run (s)	control	17.7	0.483	0.469	P>0.05
	experience	17.4	0.356		

### 3.1.3 Comparison and analysis of physical fitness index test results in the control group before and after the experiment

Comparison and analysis of physical fitness index test results before and after the control group experiment (**Table 4**). Tennis is a kind of mixed sports with and without oxygen. It requires learners not only to have good basic sports ability, but also to have a high level of agility, reaction, endurance, strength and coordination. Tennis is not suitable for learning, and learners should make efforts in physical fitness. It can be seen from the table that the 50-meter run, 5 o'clock turn back run and vital capacity have been improved to a certain extent.

The specific results were as follows: vital capacity increased from 2779.1 ml to 2993.3 ml; The 5 o'clock turn back run increased from 18.5s to 18.1s. The P test of the sample (P<0.05) showed that these two indicators were significantly improved. The author speculated that during the 16 periods of tennis learning, the subjects needed a large amount of exercise in moving hitting and playing across the net. For the reaction of the subjects, the sensitivity of short distance direction change ability and respiratory system function were improved accordingly. In the table, there is no significant difference in the number of push-ups, height and weight, and 50 meter running before and after the experiment.

**Table 4.** Comparison of physical fitness index test results before and after the control group experiment

Test index	Time	mean	standard deviation	T value	P test
Height (cm)	Before	172.33	6.213	0.301	P>0.05
	After	169.44	5.178		
Weight (kg)	Before	62.01	3.235	0.186	P>0.05
	After	62.01	3.235		
Vital capacity (ml)	Before	2779.1	546.3	1.974	P<0.05
	After	2993.3	346.7		
Push-ups (pcs.)	Before	15	6.190	0.408	P>0.05
	After	15	6.457		
50m (s)	Before	7.18	0.310	2.140	P>0.05
	After	7.02	0.134		
5o'clock-turn back run (s)	Before	18.5	0.483	3.125	P<0.05
	After	18.1	0.456		

### 3.1.4 Comparison and analysis of physical fitness index test results in the experience group before and after the experiment

The changes of various physical fitness data before and after the experiment of the experience group are shown (**table 5**): the 5 o'clock turn back run and vital capacity have improved compared with those before the experiment. The data are as follows: the average value of the five point turn back run rose from 18.1s to 17.4s; The level of vital capacity of subjects increased from 2779.1 ml to 3134.5 ml on average. The improvement of these

two data shows the influence of tennis on physical fitness. The statistics of the data also showed that there were significant differences between the two data of this group after the experiment and before the experiment, but not to a very significant extent. In addition, the change of the other four data items is not too big, and there is no significant difference in statistics. It can also be said that the body shape has not changed after using the auxiliary exercise device for teaching, while the two indicators of physical quality and physiological function have improved to some extent after the experiment.

**Table 5.** Physical fitness index test results of experience group before and after the experiment

Test index	Time	mean	standard deviation	T value	P test
Height (cm)	Before	169.55	5.178	0.319	P>0.05
	After	169.44	5.238		
Weight (kg)	Before	61.94	3.539	0.492	P>0.05
	After	60.43	3.235		
Vital capacity (ml)	Before	2779.1	546.3	2.141	P<0.05
	After	3134.5	489.9		
Push-ups (pcs.)	Before	15	5.072	0.638	P>0.05
	After	14	7.014		
50m (s)	Before	7.26	0.343	2.157	P>0.05
	After	7.01	0.459		
5o'clock-back turn (s)	Before	18.1	0.379	3.159	P<0.05
	After	17.4	0.356		

### 3.2 Test results and analysis of various technologies of the control group and experience group after the experiment

#### 3.2.1 The results and analysis of forehand and backhand techniques after the experiment of experience group and control group

The test results of forehand and backhand techniques of the experience group and the control group are shown in (table 6 and 7): for the forehand, the average scores of the control group are 31.7, 42.2, 34.0 and 6.7 respectively for the four data of technical compliance test, technical evaluation assessment, total score and stable number; The data corresponding to the experience group are 36.1, 47.3, 38.6 and 7.6. For the four items of forehand data, the paired sample T test was conducted, and the results showed that there were significant differences in the number of forehand technical compliance tests, total scores, and stability, with P values less than 0.05. For the forehand technical evaluation, the difference between the experience group and the control group was very significant (P<0.01). This shows that the experience group subjects' mastery of movement is more standard than that of the control group. This difference is more obvious than the standard assessment, stable number and total score difference. Similarly, for backhands in two groups, the average score of the four tests of backhand is 24.4, 37.7, 27.9 and 7.0 for the control group, and 29.7, 44.6, 34.3 and 7.7 for the corresponding four data of the experience group. The paired sample T test of these four data shows that the P value of the three data of backhand compliance assessment, total score and stable number is less than 0.05, which means that the three data are significantly different, For the backhand technical evaluation, the difference was more significant (P<0.01). To sum up, compared with the control group, the experience group's practice method is more conducive to learning the two techniques for forehand and backhand techniques, and the experience group that practices the experiment in mastering forehand and backhand movements has more advantages.

**Table 6.** The results and analysis of forehand techniques after the experiment of experience group and control group

	Technical compliance assessment	Action evaluation	Total score	Stability (number)
control	31.7±4.2	42.2±3.6	34.0±5.6	6.7±0.8
experience	36.1±3.1	47.3±2.9	38.6±4.2	7.6±0.8
T-value	4.350	5.182	3.467	-1.392
Significance	P<0.05	P<0.01	P<0.05	P<0.05

**Table 7.** The results and analysis of backhand techniques after the experiment of experience group and control group

	Technical compliance assessment	Action evaluation	Total score	Stability (number)
control	24.4±2.9	37.7±4.6	27.9±3.7	7.0±0.5
experience	29.7±4.2	44.6±3.5	34.3±2.4	7.7±0.3
T-value	4.535	3.914	5.325	-2.172
Significance	P<0.05	P<0.01	P<0.05	P<0.05

**3.2.2 The results and analysis of volleys techniques after the experiment of experience group and control group**

Results and analysis of volleys technology after the experiment of experience group and control group (**Table 8**). When comparing the interception techniques of the experience group and the control group, the results are shown in the above table. The average score of the control group's interception technique standard assessment is 19.2, and the experience group's interception technique standard assessment is 22.7. The paired sample T test of the two groups shows a significant difference (P<0.05); The average score of the technical evaluation of the control group and the

experience group was 40.6 and 47.2 respectively, P<0.01, indicating that the difference was very significant; The total score of the control group and the experience group is 26.1 and 30.1 respectively. There is also a significant difference between them; In terms of the number of stable volleys, their scores are respectively: control group 7.1, experience group 7.6, T-value is -2.321, and P value<0.05. It can be concluded that, for the experience group and control group, the practice method of the experience group is more conducive to the students' mastering of the volley technique in terms of the interception technique. Furthermore, the auxiliary practice brought by the experiment has better advantages than the conventional multi ball practice for the learners to learn the volley technique.

**Table 8.** The results and analysis of volleys after Experience Group and Control Group Experiments (M±SD)

group	Technical compliance assessment	Action evaluation	Total score	Stability
control	19.2±2.7	40.6±4.6	26.1±3.1	7.1±0.9
experience	22.7±2.4	47.2±4.3	30.1±2.2	7.6±0.4
T-value	3.421	4.435	4.418	-2.321
Significance	P<0.05	P<0.01	P<0.05	P<0.05

**3.2.3 The results and analysis of service techniques after the experiment of experience group and control group**

As shown **Table 9**, the average score of the service skill standard assessment of the control group is 35.1, while the service skill standard assessment score of the experience group is 38.9. The significant result obtained through the T test is P<0.05, indicating that there is a significant difference between the service skill standard assessment scores of the control group and the experience group after the same time of teaching; In terms of service skill assessment, the average score of the control group was 43.4, and the average score of the experience group was 47.2. The paired sample T test showed that P<0.01, indicating that there was a very significant difference in the technical assessment between the two groups; The average total service score of the control group was 37.4, and that of the experience

group was 41.3. The paired sample T test of the two groups showed P<0.05, indicating that the two groups had significant differences in this item; In terms of stability, the average scores of control group and experience group were 6.5 and 7.3 respectively, P<0.05 in the statistical test, which also showed significant difference between the two groups. The following conclusions can be drawn from the comparison and test of the above four achievements. In terms of service technology of the experience group and the control group, the experience group's four scores are better than the control group, especially in the technical evaluation and assessment; After 32 class hours of teaching, the service performance of the experience group is better than that of the control group; The service practice adopted by the experience group is better for learners to learn service skills than that adopted by the control group; The auxiliary practice brought by the experiment

has more advantages than the conventional practice in terms of serving.

**Table 9.** Statistics of service skills after experiment group and control group

group	Technical compliance assessment	Action evaluation	Total score	Stability
control	35.1±5.3	43.4±6.7	37.4±3.2	6.5±1.1
experience	38.9±3.4	47.2±4.3	41.3±2.4	7.1±0.6
T-value	4.452	4.342	5.391	-1.968
Significance	P<0.05	P<0.01	P<0.05	P<0.05

## 4 Discussion

### 4.1 Analysis of changes in physiological functions and physical fitness of subjects in each group after the experiment

According to the results of statistical analysis on the corresponding physical function and physical quality of the control group and experience group before the experiment, there was no statistical difference between the two groups before the experiment. It can be said that the performance of experience group is similar to that of control group. This is the starting point of the experiment to exclude the physical quality and physical function. At the end of the experiment, the basic physical fitness test was conducted again for the two groups, and then the statistics were made. That is to say, experience groups with different teaching methods and control groups with traditional teaching methods have no obvious effects and advantages in terms of improving students' basic physical quality. This shows that the advantages of experience group in various technical achievements are not due to the advantages of physical fitness. Compared with the control group, the advantage of technical achievements is brought by the teaching method. It is the use of corresponding auxiliary exercises that makes their technical performance better than the control group.

For tennis, learners must have a certain basic physical quality and physical function [8]. Tennis is a competition event dominated by net separating skills. Its field scope is much larger than that of badminton and table tennis. This requires tennis players to improve their physical fitness in the process of tennis practice [9]. One of the purposes for those who participate in various sports. But for skill-oriented projects, technical action is the most important of all factors [10]. The more standard the technical action is, the better the sports performance will be. It is an old saying that "sharpening the knife does not hurt the firewood cutter". The more clearly the athletes can understand the details of the technical movements, the faster they can master the technical movements, and the closer they are to the standard and reasonable. But the physical quality and physiological function are the foundation, and technical action is an

important guarantee [11]. Therefore, in the process of learning tennis, for learners, with the progress of learning, the gradual mastery of technology, and the continuous improvement of their level, then some modules of learners' physical quality and physiological function will also be improved.

#### Comparison and Analysis of Changes in Physiological Functions and Physical Fitness of Experimental Subjects in Different Teaching Methods

After 32 class hours of teaching, the control group and experience group have improved their physical fitness at 5 o'clock turn back run and maximum vital capacity. Although there were significant differences between the two groups after the experiment and before the experiment, they did not reach a very significant level. For the improvement of learners' physical quality and physiological function, it is in line with the essence of tennis. Improving the physical quality and physiological function of participants is one of the purposes of sports. The increase of maximum vital capacity and 5 o'clock turn back run in the two groups is in line with the original intention of the participants in tennis. Tennis is a combination of aerobic and anaerobic sports. The function of the respiratory system is the guarantee for athletes in the process of running and hitting. After a period of exercise, participants will definitely improve their ventilators. As for the 5 o'clock turn back run, before the subject's learned tennis, their running modes rarely involved turn back run, so the starting point of the 5 o'clock turn back run is low. After learning tennis for a period of time, the movement mode of tennis and the special footwork learning are very important for the subjects in the turn back running, so that they gradually get used to the turn back running around. The 50-meter run of each group shows this. According to the data, the 50-meter result is less improved, but for the data statistics, there is no significant difference between the 50-meter results before and after the experiment. It can only be said that the improvement is not obvious. However, the moving way of tennis and the changing placement point have improved learners' responsiveness and agility, which has helped learners to improve significantly in the test of 5 o'clock turn back run.

After the experiment, the body shape, quality and physiological function of the control group and the experience group were compared again. The results showed that there was no significant difference between the two groups after the end of the experiment. In the two events of maximum vital capacity and 5 o'clock turn back, both groups have improved, but there is no significant difference after the improvement. It shows that experience groups with different teaching methods and control groups with traditional teaching methods have no obvious effect and advantage in terms of improving learners' physical quality and physiological function. Therefore, the experience group that has proved to have a good performance is that it has adopted corresponding auxiliary exercises to improve the learners' technical action level, so that the experience group has its own advantages in some aspects compared with the control group in the final technical test.

#### **4.2 Summary of the effect of auxiliary exercise equipment**

The experience group is better than the control group in terms of technical compliance, technical assessment and stability. It shows that the experience group has more advantages than the control group in mastering various technical movements after using auxiliary exercise equipment. This advantage is reflected in the technical compliance assessment, technical evaluation assessment and stability. From these three aspects, it is proved that the auxiliary exercise equipment plays an important role in technical assistance. For example, it is helpful for beginners to master the details of technology, so that the technology is closer to the standard, so that the assessment will also be improved. It has something to do with the way you practice. Some people practice footwork, some practice hitting points, some practice hitting touch, etc. It enables learners to practice more effectively in a relatively small space<sup>[3]</sup>. It enables them to master more details of the actions, and then the technical actions are closer to the standard. This is illustrated by the fact that the technical evaluation of the four technical actions of the experience group is better than that of control group.

The auxiliary exercise equipment used in the experiment is made according to the pattern of hitting practice in golf. The production is quite simple. As long as there are rubber bands, tennis balls and short rods, you can make them yourself. Fixed ball and live ball can be made. These two kinds of exercises make the forms of practice diversified. The space occupied by the exercises is small. Some people are practicing multiple balls on the court. In the case of a duel, the space around the court can be used for practice. Low cost, suitable for the general population, and easy to carry and store.

For the experimental auxiliary training equipment, the training mode is mainly carried out with the cooperation of partners, so that the fixed mode of the ball and the activity mode can be better carried out. There are many ways to practice. Its biomechanical basis is to let the batter have a fixed swing when hitting the

ball, and feel the fixation of the wrist when hitting the ball and the force when hitting the ball. In the fixed mode of hitting point, you can make it clear that the power leg kicks and turns, and the comfortable hitting point is relative to your own space. The partner who helps to hold the club can change the position of the ball, so that the batter can practice the fixed swing in the movement. The auxiliary training equipment 2 balls can be moved, and the batter can hit the ball, which is closer to the complete feeling of hitting across the net. In this way, with the help of your partners, you can carry out well without a court or many balls. Its batting feeling is beneficial for practitioners to develop their own hand feeling. Its hitting force is similar to that of hitting the original earth on the field. In this way, it is easier for practitioners to suggest more standardized technical actions and have a deeper understanding of technology

#### **5 Summary**

The paired sample T test of the total scores of forehand, backhand, volley and serve in the comparison between the experience group and the control group was  $P < 0.05$ . It shows that beginners with the help of this auxiliary exercise are better at mastering various technologies than control group. Because the practitioner can carry out diversified exercises by himself or with the help of his partner under the mode of fixed and unfixed ball. You can also carry out exercises for certain techniques, including footwork, fixed movements, hitting feeling, etc.

#### **References**

1. Yanhua T, Xiaoqiu Z. Application and Effect of Integration of Static Ball and Dynamic Ball Pedagogy in the College[J]. Journal of Shenyang Institute of Physical Education, 2013, Vol. 32 Issue 3,113-114.
2. Timmerman E, De Water J, Kachel K, Reid M, Save l Bergh G. The effect of equipment scaling on children sport performance: the case for tennis[J]. Sports Sci,1466-447X, 2015; Vol. 33 (10), 1093-100.
3. Coldwells A, Davey P. Tennis ball diameter: The effect short tennis to lawn tennis[J]. Ergonomics, 2015, 37, 17-21.
4. Pellett T. Tennis racket head size comparisons and their effect on beginning college players, Achievement and self-efficacy [J]. Journal of Teaching in Physical Education, 1998, (17),453-467.
5. Davids K, Bennett S. The practice hit of tennis equipment and its effect on beginning tennis players [J]. Sports Sci,1466-447X,2010; Vol. 33 (10), 1063-100.
6. Chapman G, Bennett S. The effect of equipment constraints on the acquisition of juggling and dribbling in soccer[J]. Journal of Shenyang Institute of Physical Education, 2001,37,17-21.
7. Farrow D, Reid M. The effect of equipment scaling on the skill acquisition of beginning tennis players

- [J]. Sports Sci,1466-447X, 2010 May; Vol. 28 (7),7  
23-32.
8. Pellett T. Tennis racket head size comparisons and their effect on beginning college players, Achievement and self-efficacy [J]. Journal of Teaching in Physical Education, 1998,(17),453-467.
  9. Hammond J, Smith C. Low compression tennis balls and skill development[J]. Journal of Sports Science and Medicine, 2006, (5),575-577.
  10. Cruetter D, Davis T. Oversize standard racquets: Does it really make a difference? [J]. Research Quarterly for Exercise and Sport,2009,56,31-36.
  11. Metha R, Pallis J. The aerodynamics of a tennis ball [J]. Sports Engineering,2005,(9)111-113.