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Application of Functional Training in College Volleyball Teaching

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Abstract

Volleyball teaching in colleges and universities is faced with multiple challenges, such as the teaching content is simple, the training method is single, the students' physical quality is poor, the physical condition of the physical condition is the guarantee of volleyball technology. This research is on body function training on volleyball teaching methods of this technology in the project, the function of training system into the volleyball technique teaching, through the method of experimental teaching method to verify the function of training to the technical level of the student volleyball has been effectively improved.

Keywords: Functional training; physical ability training; college volleyball teaching; experiment teaching

I INTRODUCTION

Functional training firstly appeared in the field of foreign rehabilitation physiotherapy, later, after the researches of numerous experts and scholars, it was introduced to the sports training link of competitive sports, which is the modern relatively advanced concepts of sports training. Functional training is the new method and new mode of promoting current physical training, which is on the basis of breaking the traditional sports training concept and it belongs to the physical training category(1). For present volleyball teaching in colleges and universities, it has the characteristics of unitary training method, too simple content, mostly adopting the traditional teaching mode, and barely satisfactory teaching effect. The comprehensive physical quality of volleyball players in colleges and universities is poorer and physical ability is weak, so it is difficult for them to stand out in the fierce competition, furthermore it is unable to achieve the purpose of body building and lifetime sports, therefore, good physical quality and physical ability are the key factor of guaranteeing the playing of volleyball technology. In this paper, it takes study of the body function training method in skills teaching link of volleyball project and introduces the function motion training system into the teaching of volleyball smashing skill hoping to promote effectively students' smashing skills, improve the teaching quality of volleyball course and perfect the research and application of functional training by taking the method of functional training.

II Research Object and Method

2.1 Research Object

This paper takes the application of functional training methods in ordinary colleges' volleyball smashing skills teaching as the research object.

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2.2 Research Method

2.2.1 Method of Literature Reviews

In the research process of this paper, take the ‘physical training’ ‘functional training’ ‘volleyball teaching in colleges and universities’ *etc.* as the theme, and obtain a large number of journals, books *etc.* document literature, in CNKI, Wanfang Database, SuperStar Digital Library, besides, in our school’s library, obtain the related literature about physical training, volleyball teaching and functional physical training so that to provide abundant literature foundation for this article.

2.2.2 Expert Interview Method

Consult the related knowledge from the teachers who are engaged in the volleyball teaching and have rich teaching experience and consult the scientificity of the adopted teaching methods and training methods in this paper from the professional volleyball coaches and fitness coaches of Zhengzhou team or He’nan team.

2.2.3 Mathematical Analysis Method

Using SPSS17.0 to take statistical analysis of experimental data besides, from the perspective of quantization, analyze the related research issues and phenomenon so that to provide objective digital reference for in-depth study.

2.2.4 Experimental Teaching Method

Develop experimental teaching of 16 weeks, 2 hours a week, a total of 32 hours for experimental class and comparative class at the same time besides, the experimental class takes the teaching method of functional physical training and the comparative class take the common physical training method, except for that, the teaching content and teaching schedule are the same.

2.2.4.1 Experimental Objective

Introducing functional physical training methods to the ordinary university volleyball teaching classroom can enrich the teachers' teaching methods and means, further improve the quality of teaching, vigorously improve the students’ enthusiasm on volleyball, strengthen students' special physical ability and guarantee the implementation of high-quality and efficient classroom, at the same time provide valuable reference for the introduction of functional training teaching methods to the teaching of other courses.

2.2.4.2 Experimental Scheme

Randomly select two classes (Male Student Classes) from the volleyball classes of 2014 in Zhengzhou University of Industry Technology and name them respectively experimental class and comparative class, besides, the students sources of this two classes are medical school, business school, management school and construction school, *etc.* nine departments and the number of the students in each class is 15. Develop experimental teaching of 16 weeks, 2 hours a week, a total of 32 hours for experimental class and comparative class at the same time besides and the teaching time is from September to December, 2015. Besides, the experimental class takes the teaching method of functional physical training and the comparative class take the common physical training method, except for that, the teaching content and teaching schedule are the same. Test method is two-step run-up smashing, through the teaching experiment, take statistical analysis of experimental data of experimental class

and comparative class so that to validate whether the functional physical training method can improve the effect of volleyball teaching or not.

2.2.4.3 Experimental Control

In order to ensure the truth and effectiveness of this experiment and improve experimental validity, we specifically take the control of factors that may influence the truth of experimental data in the process of the implementation of this experiment. The control methods are as follows:

(1) Equalization processing of experimental subjects: test the basic situation, physical quality and volleyball technical level of the students participating in the experiment before the experiment, besides, take T test so that to ensure that there is no obvious difference between the comparative class and experimental class.

(2) Stability of teaching plan; In order to avoid and control the experimental error brought by the differences of teaching, it is required that try not to disturb the original teaching plan and the experimental class and comparative class adopt the same teaching plan. Except that take function training methods for students of experimental class in the training process, the other aspects of operation processes, such as training hours, location, equipment, *etc.* are same for comparative class and experimental class.

(3) Consistency of instructor; In order to reduce the experimental effect error of learning and practice effect on students because of different teachers' ability and different styles of training, both the comparative class and experimental class will be taught by the myself.

(4) Separation of exam and teaching; Adopt the method of teaching training-testing separation and in the testing process, take the double blind experiment to test the skills of the students in the two classes by another four experts whose professional title are above the level of associate professor and then take independent marking.

2.2.4.4 Experiment Procedure

A. Taking Pre-test for Experimental Class and Comparative Class

In order to test whether the basic situation, physical quality and volleyball basic technology *etc.* test indicators of students in the two classes have significant differences or not, the author himself has taken pre-test of the students in this two classes.

a. Difference Test of the Basic Situation of Experimental Class and Comparative Class

Before the experiment, take statistics and measurement of basic situation of 16 experimental subjects, such as: age, height and weight, after arranging the statistical results to independent sample and make T test to take comparison and analysis. The results show that the basic situation of students in experimental class and comparative class have no significant difference ($P > 0.05$), the results as shown in the following table.

Table 1. Differences test statistics of the basic situation of experimental class and comparative class (n1=15，n2=15).

	Experimental class	Comparative class	T	P
Age	19±0.31	18±0.96	0.442	**>** 0.05
Height（cm）	174.42±3.09	175.36±4.66	-1.818	**>** 0.05
Weight（kg）	58.47±5.32	60.18±7.71	-1.577	**>** 0.05

b. Difference Test of the Physical Quality of Experimental Class and Comparative Class Before the experiment, test the physical quality of students in experimental class and comparative classes and the test includes one-step run-up of vertical jump up to touch, 50-meter run, standing long jump, arrange the statistical results and make T test to take comparative analysis. The results show that the physical quality of students in experimental class and comparative class have no significant difference (P > 0.05), the results as shown in the following table.

Table 2 Differences test statistics of the physical quality of experimental class and comparative class (n1=15, n2=15).

	Experimental class	Comparative class	T	P
One-step run-up of vertical jump up to touch（**m**）	2.27±0.15	2.20±0.23	1.285	**>** 0.05
50-meter run（**s**）	7.36±1.29	7.91±1.78	1.652	**>** 0.05
Standing long jump（**cm**）	233±21	228±26	-1.339	**>** 0.05

c. Before the experiment, test the volleyball special skills of students in experimental class and comparative classes: one-minute underpass by oneself, one-step run-up smashing, one-minute passing, of which, the one-step run-up smashing will be calculated in the times of 10 success over-net volleyballs, and then arrange the statistical results and make T test to take comparative analysis. The results show that the physical quality of students in experimental class and comparative class have no significant difference (P > 0.05), the results as shown in the following table.

Table 3. Differences test statistics of the volleyball special skills of experimental class and comparative class (n1=15，n2=15).

	Experimental class	Comparative class	T	P
One-minute underpass by oneself（**times**）	63±12	69±29	1.922	**>** 0.05
One-step run-up smashing（**times**）	5±2	4±4	1.645	**>** 0.05
One-minute passing（**times**）	31±20	27±19	0.832	**>** 0.05

In conclusion, after taking test and statistics of the basic situation, physical quality and volleyball special skills of the students in experimental class and comparative class and after the T test (P>5), the various indicators of this test all have no significant difference, so we can get that, the students in experimental class and comparative class are in the same level so they can be regarded as the equivalent subjects for this teaching experiment.

2.2.4.5 Experimental Assumption

Assume that the deficiency of the screening of FMS body movement function for seven tests on basic action pattern development influenced the effect of volleyball smashing skills, through improving the functional movement patterns basis to improve the volleyball smashing skills, finally achieve the purpose of improving the volleyball smashing teaching.

III Experimental Procedure

3.1 Working-out of Functional Training Plan

3.1.1 FMS Functional Movement Screen

Functional Movement Screen is a physical function evaluation method designed by Gray Cook *et al.*, and it is a kind of innovative action pattern evaluation system[(2)], and it can screen the athletes' body dysfunction or body morbidity before the sports, which is convenient for checking erroneous ideas at the outset, reduce the sports injuries to the minimum degree and reduce the occurrence of injuries, meanwhile it provides a scientific reference for the making of training plan. FMS test method is simple and easy to operate and it consists of seven indicators, which respectively are squat, hurdle-striding, straight-line forward lunge, shoulder flexibility, active leg-raising when supine, body-stable push-ups and stable spinning. The full score of each index is 3 and followed by 2-score action, 1-score action and 0-score action.

3.1.2 Statistical Situation of Functional Test Results for Experimental Subjects

Break the class boundaries and organize the students of the two classes to take uniform functional testing screening, besides, document the testing results and take a detailed analysis. The analysis result as shown in the following table.

Table 4. Statistical table of FMS testing scores.

Serial number	Name	Squat	Hurdle-striding	Straight-line forward lunge	Shoulder flexibility	Active leg-raising when supine	Body-stable push-ups	Stable spinning	Scores
1	Wang××	3	2	2	3	1	2	2	15
2	Yuan××	3	1	3	2	1	1	3	14
3	Ma×	2	3	3	3	2	2	3	18
4	Wang××	2	3	2	2	3	3	3	18
5	Zhao××	3	2	2	1	3	3	2	16
6	Lu××	3	2	2	1	3	3	2	16
7	Shang×	2	3	3	1	2	2	3	16
8	Chen××	3	3	3	1	2	2	3	17
9	Fan××	1	2	2	2	3	3	2	15
10	Zhong××	2	3	2	2	3	3	2	17
11	Zhang××	2	3	3	3	2	3	3	19
12	Feng×	1	3	3	3	3	2	3	18
13	Li××	1	2	2	2	3	2	1	13
14	Wang××	1	1	3	2	1	3	3	14
15	Zhao××	2	2	3	3	3	2	1	16
16	Zhang××	2	1	2	2	1	2	2	12
17	Zhang××	3	3	2	2	3	1	2	16
18	Cai××	3	2	3	2	2	3	3	18
19	Wang××	3	3	3	2	3	2	1	17
20	Niu××	2	2	2	1	3	3	1	14
21	Bai×	2	2	3	1	2	3	1	14
22	Hou××	2	1	3	1	2	3	2	14
23	Wang××	3	2	1	2	3	3	2	16
24	Jin××	2	1	2	3	3	2	3	16
25	Liu×	3	2	3	2	2	3	3	18
26	Kang××	3	3	3	2	3	2	1	17
27	Tian××	2	2	2	1	3	3	1	14
28	Zheng××	2	2	3	2	2	3	1	15
29	Zeng××	2	1	3	1	2	3	2	14
30	Li××	3	1	3	2	2	3	3	17
	Scores	68	63	76	57	71	75	64	474

Through the above table, we can know that, for the individual scoring comparison of the seven functional test items, the item with the highest scores is straight-line forward lunge with the total scores of 76, the second is the body-stable push-ups with the total score of 75, the third is active leg-raising when supine with the total score of 71, the fourth is the squat with the total score of 68, the antepenultimate is the stable spinning with the total score of 64 , the last but one is hurdle-striding with the total score of 64 and the last one is shoulder flexibility

with the score of 57. From the result of horizontal comparison, we can know that the highest score of the seven functional test items is 19 and the lowest score is 12, besides, the average score is 15.8.

Through the analysis scores situation, we can conclude that there are some shortcoming in the aspects of closed kinematic chain of ankle joint, bidirectionality and symmetric flexibility of shoulder and thoracic vertebra, bilateral function flexibility and stability of knee and ankle, shoulder flexibility and stability of body in sagittal plane *etc*. The lack of body stability and controlling, poor spinning stability and insufficient body flexibility, especially poor shoulder flexibility indicate that coordination between shoulder joint activity and worked muscle groups is not perfect enough and when completing some simple body strength training movement, the movement quality is bad. **The reason for this phenomenon mainly is the uneven training of upper and lower limbs strength, if the upper limbs get more training, the muscle strength** is strong, however, the malleability poor, on the other hand, if the targeted flexibility and flexibility training is less, after a long period, the physical training will be out of balance and the **upper and lower limbs will be inconsistent and** the lack of flexibility is the main problem, therefore, we have to strengthen the flexibility exercises, besides, we need to place emphasis on the correction and improvement of wrong movements in the training process.

3.1.3 Making of Functional Training Plan

According to the result of the above FMS actions screening and combined with the teaching practice and students' specific situation, we made two phase of the training program. Phase 1 is the basic strength training and the training period is two months, a total of eight weeks, once a week, besides, the main goal of the training plan is correcting the basic body postures of the subjects and improving the body movement action pattern of the experimental objects, meanwhile, focusing on intensifying the strength of body trunk and limbs and the stability of lower limbs so that to lay a solid foundation for the explosive force training in stage 2. The detailed training program as shown in the table below.

Table 5. Training Plan for the First Stage of Functional Training.

Serial number	Movement name	Exercise load	Class number	Number of times	Interval (S)
1	bench press	10RM	3	10	90
2	Oblique splits with elastic force twisting	elastic band	3	10 (left、right)	90
3	Pull-up with elastic force twisting	elastic band	3	10 (left、right)	90
4	kettle-bell forward swing	20-30kg	3	10	90

5	Barbell Full Squat	10RM	3	10	90
6	Forward lunge	20-30kg	3	6 groups	90

According to the training plan arrangement in stage 1, 6 practice are arranged for the plan in phase 2 and the specific content as shown in table 6. Before training, the players have to take adequate warm-up preparation to transfer the muscle activity and avoid sports injury. Practice in phase 2 focuses on the training of explosive force, especially the explosive power and jumping ability of upper arms so that to lay the foundation for the teaching of volleyball smashing. So it is must emphasized that complete the action quickly and efficiently in a short time and pay attention to 'quality' but 'quantity', besides, require the students to complete each composite action practice actively.

Stable 6 Training Plan for the Second Stage of Functional Training

Serial number	**Movement name**	**Exercise load**	**Class number**	**Number of times**	**Interval (S)**
1	Burpee	10RM	3	12	10
2	Flip-over type of push-up	20-30kg	3	6-8	10
3	Bar-bells fast half squat	30-45kg	3	12	10
4	Fast bench press	20-30kg	3	12	10
5	Continuous and fast hurdle-jumping	85cm	3	10	20
6	Rope ladder training	One's own weight	3	1	10

3.2 Concrete Implementation of Functional Training

From September to December, 2015, develop experimental teaching of 16 weeks, 2 hours a week, a total of 32 hours for experimental class and comparative class simultaneuously, besides, the experimental class take the teaching method of functional physical training and the comparative class take the common physical training method, except for that, the teaching content and teaching schedule are the same. Through the teaching experiment, take statistical analysis of the experimental data of experimental class and comparative class.

IV Experimental Result and Analysis

4.1 After the experiment, difference test of the physical quality for experimental class and comparative class.

Table 7. Difference test statistics of the physical quality for experimental class before and after the experiment (n=15).

	Pre-experiment	Post-experiment	T	P
One-step run-up of vertical jump up to touch（m）	2.27±0.15	2.59±0.18	0.901	**<** 0.05
50-meter run（s）	7.36±1.29	7.04±1.93	1.438	**>** 0.05
Standing long jump（cm）	233±21	251±37	0.659	**<** 0.05

Table 8. Difference test statistics of the physical quality for comparative class before and after the experiment（n=15）.

	Pre-experiment	Post-experiment	T	P
One-step run-up of vertical jump up to touch（m）	2.20±0.23	2.31±0.25	1.285	**>** 0.05
50-meter run（s）	7.91±1.78	7.34±1.54	1.112	**>** 0.05
Standing long jump（cm）	228±26	230±25	-1.309	**>** 0.05

From the table 7 and table 8, we can be know that, after the experiment, there is obvious improvement for the score of two items of the physical quality indexes for the students in the experimental class and the two items respectively are one-step run-up of vertical jump up to touch and standing long jump, besides, the improvement amplitude have obvious difference. Secondly for the students' physical quality test in comparative classes before and after the experiment, the score of three items all have certain increase, however, there is no significant difference for the increase amplitude compared with before. Thus, the training methods adopted in this experiment have a significant effect on improvement of students' jumping ability and explosive force.

Table 9. Difference test statistics of volleyball speciality skills for experimental class (n=15).

	Experimental class	Comparative class	T	P
One-minute underpass by oneself (times)	63±12	78±17	1.792	> 0.05
One-step run-up smashing (times)	5±2	7±2	0.644	< 0.05
One-minute passing (times)	31±20	36±15	1.673	> 0.05

Table 10. Difference test statistics of volleyball specialty skills for comparative class (n=15).

	Experimental class	Comparative class	T	P
One-minute underpass by oneself (times)	69±29	72±11	1.922	> 0.05
One-step run-up smashing (times)	4±4	5±2	1.645	> 0.05
One-minute passing (times)	27±19	35±10	1.832	> 0.05

4.2 Statistics of Volleyball Specialty Performance Evaluations After the Experiment

Through table 9 and table 10, we can know that, after the experiment, among the post-experiment volleyball specialty indicators for students in experimental class, three items of grade have certain improvement, especially for the frontal overhand service, its grade has impressive rise, which has significant improvement compared with before. On the other hand, among the post-experiment volleyball specialty indicators for students in comparative class, three items of grade have certain improvement, but comparatively speaking, it does not obtain a significant increase. Therefore, the training methods adopted in this experiment have a significant effect on the improvement of students' over-hand service skill of volleyball skills.

4.3 Test Results Analysis of Volleyball Smashing Skill

The last link of the experiment is the test for volleyball two-step run-up smashing skill

and the final test of this experiment adopts the examination-book separation model, so we specifically engage the teachers with rich professional teaching experience and excellent training achievement to score the test for their live skills performance.

Table 11. Test score of volleyball two-step run-up smashing for experimental class (n=15).

Serial number	Name	Success times (10 times)	Skill score (100 scores)
1	Wang××	4	85
2	Yuan××	7	93
3	Ma×	8	93
4	Wang××	5	88
5	Zhao××	4	86
6	Lu××	9	99
7	Shang×	5	90
8	Chen××	4	86
9	Fan××	4	85
10	Zhong××	5	88
11	Zhang××	6	87
12	Feng×	8	95
13	Li××	8	95
14	Wang××	9	98
15	Zhao××	6	88

Table 12. Test score of volleyball two-step run-up smashing for comparative class (n=15).

Serial number	Name	Success times (10 times)	Skill score (100 scores)
1	Zhang××	3	80
2	Zhang××	7	90
3	Cai××	5	85
4	Wang××	8	95
5	Niu××	5	86
6	Bai×	6	87
7	Hou××	3	83
8	Wang××	4	85
9	Jin××	5	89
10	Liu×	4	86

11	Kang××	6	89
12	Tian××	7	92
13	Zheng××	3	80
14	Zeng××	7	91
15	Li××	5	88

By taking statistical analysis of the data in both the tables above, we know that, the test scores of experimental class are significantly higher than that of comparative classes, and the corresponding P values are less than 0.05, which indicates that the test scores of experimental class have significant differences with that of comparative classes. After analyzing the reasons, we can know that after taking training by the targeted functional training methods, the scores of the specific skills test for students in experimental class are significantly higher than that in comparative class, visible function training methods for the improvement of teaching in volleyball dropping shot roommate significant role.

V Conclusion

Body functional training method breaks the traditional sports training concept and puts forward new power and new model for the the innovation of current physical training method. The time of the introduction of functional training concept into China is still short and its training methods have already got wide application research on the aspects of competitive sports projects, however, the practical research achievement of the entering of functional training into physical education teaching classroom is rarely reported. The author tries to take some discussion of the application and popularization of functional training methods depending on his own knowledge, although the preliminary work is complex, the experiment process is difficult to grasp, besides, the mathematical analysis is difficult and complicated, but the result is still optimistic, through introducing body functional training method into volleyball class, the volleyball smashing skills get obviously improvement. We are pleasant for that, at the same time, there are still some disadvantages for functional training in the process of volleyball teaching training, so it needs more attention in the following teaching process.

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