The Study of the Influence of Weak Hand Training on the Dribbling Skills of College Students in Basketball

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Abstract: In the teaching and training of basketball, the learning and training of dribbling skills is the most basic and important part, and the level of drib skills also directly affects the level of basketball skills. In the survey, it was found that the sports ability of the weak side hand of college students is relatively weak, the limbs on both sides have not been evenly developed, which hinders the synchronous development of the limbs on both sides of the students and has an adverse effect on the of their dribbling skills and basic basketball skills. The subjects of this study were Beijing University of Chemical Technology students in public sports basketball classes. This study conducted an 8-week teaching experiment on 46 college students through a variety of scientific research methods, including literature, questionnaire, statistical and experimental methods, in which the experimental group adopted the weak hand training method and the control group adopted the traditional teaching method. Compared with traditional dominant hand training, weak side hand training is more conducive to improving college students' various dribbling skills. The rational use of the law of two-sided transfer of motor in college basketball teaching can improve students' interest in learning and enhance their confidence in learning basketball well. In the teaching of basketball skills in colleges and universities, the practice and training of the weak side limbs should be strengthened to improve the mastery level of various skills and enhance the overall technical level of basketball.

Keywords: Weak Hand Training; College Student; Dribble Technique; Basketball; Experimental Study

1. Preface

1.1 Research Background

Basketball is the most popular and beloved sport among college students, and it is also an important part of college physical education. Among the various of basketball, dribbling skills play a pivotal role. In the teaching and training of basketball, the learning and training of dribbling skills are the most basic and important, and the level of dribbling skills directly affects the level of basketball skills. In the survey, it was found that the motor ability of the weak side hand of students is relatively weak, and the limbs on both sides have not been evenly developed, which hinders the synchronous development of students' limbs on both sides and has an effect on the improvement of their dribbling skills and basic basketball skills.

Basketball is a typical hand sport, and the weak side fingers refer to the side of the hand that is used less frequently and has slightly worse flexibility. Training for the weak side hand effectively improves the flexibility of the hand and can effectively develop the functions of the corresponding brain hemisphere. The two hemispheres of the brain are responsible for different resonances, with the left hemisphere responsible for abstract thinking functions and the right hemisphere responsible for visual thinking functions. By fully developing the left and right hemispheres of the brain, the overall development level of the brain can be further improved. Weak side hand training develops the abilities of the left and right hemispheres of the brain, improving the efficiency of the entire brain. The brain commands and affects the efficiency of the body's movements, and the activity ability of the hand also affects the development degree of the left and right hemispheres of the brain.

Weak-side hand training helps students to switch flexibly between their left and right hands, further improving the coordination of both hands and their sense of the ball, to cope with the constantly changing court situation,

make timely tactical adjustments, and improve their basketball skills. Carrying out weak-side hand training is a powerful measure to solve the serious dependence on one hand and the low technical level of college students, and it is also the key to improving the comprehensive technical level of college students' basketball.

1.2 Research Significance

The learning and training of dribbling skills in basketball is the most basic, and dribbling training is reflected in all basketball teaching and training, and dribbling skills intuitively reflect the level of basketball skills. By analyzing the effect of weak hand training on the dribbling skills of college students, and analyzing the feasibility of the weak hand development model widely used in college basketball teaching courses, it can help basketball coaches to deeply understand the teaching content and positive effects of weak hand training, and provide references for the training of basketball skills and the balanced development of strong and weak hands in college students.

By analyzing the effect of weak-side hand training on the dribbling skills of college students, we can understand the impact of balanced development of both limbs students' interest in learning, and put forward practical and feasible plans and references for the teaching reform of college basketball courses, provide references for the innovation and development of basketball, and promote the improvement of college students' basketball sports ability.

1.3 Research Status

Zhang in "Reflections on the Training of the Weak Hand for Adolescent Basketball Players," took the effect of the strong hand skills of basketball students in general physical education classes transferring to the weak hand as the research object and conducted a series of experiments. The experimental results show that cross-education can effectively improve students' learning outcomes of weak hand sports skills. Therefore, in the teaching and training process of basketball, the application of cross-education methods to the teaching of basketball general physical education classes has important practical significance for the teaching of basketball general physical education classes. [1]

Du's "Application Research on the Transfer of Lateralization in the Teaching of Basketball General Courses in Ordinary Colleges and Universities in Shand Province" has conducted research on several main aspects affecting the level of basketball skills and has made some exploratory attempts to apply it to the level of basketball skills. At same time, the important reasons affecting students' basketball technical ability were analyzed, and the research on how to improve students' bilateral ability was carried out. [2]

Zhang in the article "Experimental Research on the Training of Weak Side Hand Ability of Basketball Athletes in Different Age Groups": Based on principle of technical transfer and combined with the actual situation of basketball teaching, it explains how to apply this principle to the right place in basketball physical education teaching, so that can play a more positive role in the learning process, and thus effectively avoid or reduce the negative transfer of students, thus laying a certain foundation for the teaching work of basketball. [3]

Branford’s cultivation of the weak hand in young children shows that there is a significant correlation between motor impulsivity and skill transfer. When one finger is used, the other finger will produce an unconscious movement impulse. In the process of learning motor skills with both limbs, when one limb is trained, there is a phenomenon of neural activity in the brain hemisphere that controls the non-related hand, which can promote the transfer of the contralateral limb in a non-conscious state, thus improving the contralateral limb’s mastery of the same motor skills. [4]

The Hick experiment research confirmed that: the same action will appear in the synchronous change of the left and right lower limb movements, and it is that when athletes practice movements, they can not only make a common cognitive of the weak hand movements, but also lay a foundation for the research results of the athletes' reaction and movement recognition. At the same time, in this experiment, through the practice of unilateral body movement skills, it can make the healthy side of the body produce movement stimulation. It is proposed that when athletes practice movements, the practice of contralateral directionality not only provides common knowledge for the practice of weak side directionality but also provides new ideas for the learning of muscle movement perception. [5]

To sum up, although domestic and foreign scholars have carried out a lot of research on the lateral transfer of sports skills, there are few studies on application of this theory in college basketball dribbling teaching at present. Therefore, this article plans to carry out research on the application of this theory in college basketball teaching through experiments. Provide theoretical basis and practical reference for the teaching and training of college basketball. [6-11]

2 Research Object and Method

2.1 Research Object

The effect of weak-side hand training on the dribbling skills of college students was taken as research object, with 46 students participating in the school's public physical education basketball teaching course as the experimental object, and the changes in dribbling skills before and 8 weeks were taken as the survey object.

2.2 Research Methods

2.2.1 Literature research method

According to the needs of this article, by logging into the China National Knowledge Infrastructure and the China Journal Network, and using keywords such as "weak side hand training" and "dribbling skills" for search, reading relevant papers and journals in this field, and conducting inductive analysis, the current development status of weak side hand training at home and abroad is understood, and the influence of weak side hand training on basketball dribbling skills is understood and thought about, and the ideas and methods of this article are found, and the basis and theoretical support for this study are provided.

2.2.2 Experimental method

(1) Test method

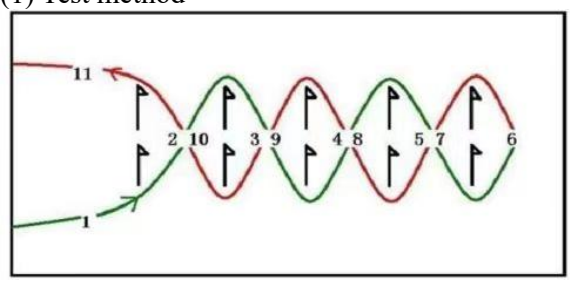

Figure 1. Dribbling Test Route Map

As shown in Figure 1 draw a rectangular court 20 meters long and 7 meters wide on the basketball court, with the green route as the starting direction and the red route as the return direction. During the test, dribble and sprint at full speed on the route of number 1; then enter the area with obstacles, and use the front change dribble, under-the-leg dribble, behind-the-back dribble, and turn dribble to pass the obstacles in turn at the points 2, 3, 4, and 5; then return at point 6, and use the front change dribble, under-the-leg dribble, behind-the-back dribble, and turn dribble to pass the obstacles in turn at the points 7, 8, 9, and 10; finally, accelerate and dribble through the finish line on the route of number 11.

(2) Experimental Design

The experimental design of this experiment adopts the principle of single-blind experiment, that is, the students themselves do know that they are participating in this experiment. This experiment lasted for 8 weeks, with 3 sessions per week, each lasting for 20 minutes. The content is shown in Table 1. Two groups of physical education classes have the same training content. The control group uses the dominant hand for training, that, all training content is trained with the dominant hand. The experimental group uses the weak hand for training, that is, 50% of the training content is with the dominant hand and 50% with the weak hand. The training of strong and weak hands is alternated, that is, after one group of dominant training, one group of weak hand training is carried out, and so on. The specific teaching content is shown in Table 1.

Table 1. Training Content of the Experimental Group and the Control Group

Week number	Training content	Experimental group	Control group
1-2 weeks	Dribble low in place Dribble high in place	Preferred hand: 40 times/set*2 sets, rest 30 seconds Weak hand: 40 times/set*2 sets rest 30 seconds	Preferred hand: 40 times/set*4 sets, rest 30 seconds
3-4 weeks	Dribbling low with one hand while moving Dribbling high with one hand while moving	Preferred hand: 40 times/set*2 sets, rest 30 seconds Weak hand: 40 times/set*2 sets rest 30 seconds	Preferred hand: 40 times/set*4 sets, rest 30 seconds
5-6 weeks	One-handed in-place front-to-back	Preferred hand: 40 times/set*2 sets, rest 30	Preferred hand: 40 times/set*4

	crossover One-handed in-place side-to-side dribbling	seconds Weak hand: 40 times/set*2 sets rest 30 seconds	sets, rest 30 seconds
7-8 weeks	Dribbling around cones on the move Dribbling with sudden stops and starts on the move	Preferred hand: 40 times/set*2 sets, rest 30 seconds Weak hand: 40 times/set*2 sets rest 30 seconds	Preferred hand: 40 times/set*4 sets, rest 30 seconds

(3) Evaluation indicators

The dribbling technique is used as the evaluation content in this assessment. In order to objectively evaluate the teaching effect, the method of coach scoring will be adopted. In the process of technical test scoring, a scoring evaluation group consisting of myself and two other basketball coaches will be formed to score and evaluate, and the average score will be taken as the final score of each experimental object. The dribbling technique test indicators are four: front body change dribbling, under-the-leg dribbling, behind-the-back dribbling, and turning dribbling. Scoring basis: dribbling body posture; number of control errors; dribbling stability; dribbling strength. The full score is 100 points, each technical evaluation indicator is 25 points, and the total score is calculated in the end.

(4) Experimental control

Experimental control is achieved by controlling other variables to ensure the authenticity and reliability of the experimental results as much as possible. other variables except the factors studied in the experiment need to be experimentally controlled to eliminate the influence of other factors on the experimental results. Summarizing and generalizing different stages of the experiment, discovering problems and continuously adjusting ensure that the experiment can proceed in the desired direction.

2.2.3 Mathematical statistics method

The relevant data before and after the experiment were collated and counted by using EXCEL spreadsheet, SPSS sample T test and independent sample T test and other related software, and compared and analyzed.

3 Research Results and Analysis

3.1 Comparison of Pre-experiment Basketball Technique Scores of the Two Groups of Students

As shown in Table 2, before the start of the experiment, the experimental group students' front-of-body change-of-direction dribbling score was 65.91 ± 4.32 points, and the control group students' front-of-body change-of-direction dribbling score was 66.74 ± 6.00 points. After independent sample T test analysis, it was found that the P value > 0.05, there was no significant difference statistically, indicating that there was no obvious difference between the two groups of students in front-of-body change-of-direction dribbling skills before the experiment, and they had good homogeneity.

Table 2 Comparison of Pre-Experiment Basketball Skills Scores between the Two Groups of Students

Test item	Experimental group(N=23)	Control group(N=23)	T	P
Dribble with a change of direction in front of the body	65.91±4.32	66.74±6.00	0.536	0.595
Dribbling between the legs	68.32±6.90	71.74±7.87	1.573	0.123
Behind the back dribbling	72.48±5.78	70.52±5.12	1.215	0.231
Turning dribbling	63.09±5.64	65.57±5.77	1.472	0.148

The results of dribbling between the legs test for the experimental group students were 68.32 ± 6.90 points, for the control group students were 71.74 ± 7.87 points. After analysis by independent sample T test, it was found that the value > 0.05, there was no significant difference statistically, indicating that there was no obvious difference between the two groups of students in the dribbling between the legs technique before the experiment, and they had good homogeneity.

The results of the behind-the-back dribbling test for the experimental group students were 72.48 ± 5.78 points, for the control group students were 70.52 ± 5.12 points. After analysis by independent sample T test, it was found that the value > 0.05, there was no significant difference statistically, indicating that there was no obvious difference between the two groups of students in the behind-the-back dribbling technique before the experiment, and they had good homogeneity.

The results of the experimental group students' turning dribbling were 63.09 ± 5.64 points, and the results of control group students' turning dribbling were 65.57 ± 5.77 points. After independent sample T test analysis, it was found that P value > 0.05, there was no significant difference statistically, indicating that there was no obvious difference between the two groups of students in turning dribbling before the experiment, and they had good homogeneity.

3.2 Comparison of Basketball Skills Scores before and after the Experiment in the Experimental Group

Table 3 Comparison of Basketball Skills Scores before and after the Experiment in the Experimental Group

Test item	Before the experiment(N=23)	After the experiment(N=23)	T	P
Dribble with a change of direction in front of the body	65.91±4.32	82.83±7.12	9.260	0.000
Dribbling between the legs	68.32±6.90	85.09±5.36	11.383	0.000
Behind the back dribbling	72.48±5.78	85.35±8.85	10.348	0.000
Turning dribbling	63.09±5.64	79.30±5.76	28.321	0.000

As shown in Table 3, after 8 weeks of weak side hand training, the experimental group students; in the aspect of front of body change of direction dribbling score, from 65.91 ± 4.32 points before the experiment to 82.83 ±7.12 points after the experiment; in the aspect of dribbling between the legs score, from 68.32 ± 6.90 points before experiment to 85.09 ± 5.36 points after the experiment; in the aspect of behind the back dribbling score, from 7.48 ± 5.78 points before the experiment to 85.35 ± 8.85 points after the experiment; in the of turn around dribbling score, from 63.09 ± 5.64 points before the experiment to 79.30 ± 5.76 points after the experiment, the above items were analyzed by paired sample T test, and it was found that the P value was all < 0.05, which was statistically significant. It shows that after 8 weeks of weak side hand training, the students' skills in these items have been significantly improved.

3.3 Comparison of basketball skills scores before and after the experiment in the control group

Table 4 Comparison of Basketball Skills Scores before and after the Experiment in the Control Group

Test item	Before the experiment(N=23)	After the experiment(N=23)	T	P
Dribble with a change of direction in front of the body	66.74±6.00	71.57±9.81	2.819	0.010
Dribbling between the legs	71.74±7.87	75.70±6.79	2.740	0.012
	70.52±5.12	78.04±6.77	-8.442	0.000
Behind the back dribbling	65.57±5.77	73.35±5.79	-8.523	0.000
Turning dribbling				

As shown in Table 4, the control group students after 8 weeks of dominant hand training; in the front of the body change of direction dribbling score, from 66.74 ± 6.00 points before the experiment to 71.57 ± 9.81 points after the experiment; in dribbling between the legs score, from 71.74 ± 7.87 points before the experiment to 75.70 ± 6.79 points after the experiment; in the back dribbling score, from 70.52 ± 5.12 points before the experiment to 78.04 ± 6.77 points after the experiment; in the turn dribbling score, from 65.57 ± 5.77 points before the experiment to 73.35 ± 5.79 points after the experiment, the above items were analyzed by paired sample T test, and the P value was found to be < 0.05, which was statistically significant. It shows that after 8 weeks of dominant hand training, students' front of the body change of direction dribbling, cross dribbling, back dribbling and turn dribbling skills can be significantly improved.

3.4 Comparison of the Results of the Two Groups of Students' Basketball Skills after the Experiment

Table 5 Comparison of the Results of the Two Groups of Students' Basketball Skills after the Experiment

Test item	Experimental group(N=23)	Control group(N=23)	T	P
Dribble with a change of direction in	82.83±7.12	71.57±9.81	4.456	0.000

front of the body				
Dribbling between the legs	85.09±5.36	75.70±6.79	5.206	0.000
Behind the back dribbling	85.35±8.85	78.04±6.77	3.146	0.003
Turning dribbling	79.30±5.76	73.35±5.79	3.497	0.001

As shown in Table 5, at the end of the 8-week experiment, in terms of the score of the front change of direction dribbling, the experimental group was 82.83 ± 7.12 points, and the control group was 71.57 ± 9.81 points; in terms of the score of dribbling between the legs, the experimental group was 85.09 ± 5.36 points, and the control group was 75.70 ± 6.79 points; in terms of the score of the back dribbling, the experimental group was 85.35 ± 8.85 points, and the control group was 78.04 ± 6.77 points; in terms of the score of the turn dribbling, the experimental group was 79.30 ± 5.76 points, and the control group was 73.35 ± 5.79 points; after the independent sample T test analysis, it was found that $P < 0.05$, which was statistically significant, indicating that compared with the 8-week dominant hand training, the 8-week weak hand training had a more significant effect on improving students' basketball skills.

According to the experimental results: before the experiment, there was no significant difference in the scores of the two groups of students in the four drib skills of turning dribbling, behind-the-back dribbling, between-the-legs dribbling, and front-of-body change-of-direction dribbling ($P>0.5$). After 8 weeks of teaching experiments, the four basketball dribbling skills of the experimental group were significantly better than those of the control group ($P<005$). During the experiment, the total training volume of the experimental group and the control group was consistent, and other variables were effectively controlled. This shows that through dribbling training, there is a transfer from the weak side hand to the dominant side hand. This result is consistent with the channel model theory of bilateral transfer. In process of learning skills, training the left hand will stimulate both hemispheres of the brain, leaving a memory in the right brain while also transferring along the channel the left brain, which also enhances the ability of the right hand controlled by the left brain.

4 Conclusions and Suggestions

4.1 Conclusions

(1) After an 8-week teaching experiment, we can see that compared with traditional dominant hand training, weak side hand training is more conducive to improving college students' various dribbling skills.

(2) There is a bilateral transfer of skills in the process of learning basketball skills, and the bilateral transfer of skills is asymmetric. The experimental conclusion of the experimental group and the control group can show that the effect of weak side limb to strong side limb transfer is better than that of strong side limb to weak side limb transfer.

(3) The rational use of the bilateral transfer law of motor skills in college basketball teaching can improve students' interest in learning and enhance their confidence in learning basketball well. It can promote the balanced development of bilateral limb skills and improve basketball skills comprehensively.

4.2 Suggestions

(1) In the teaching of basketball skills in colleges and universities, the practice and training of the weak side limbs should be strengthened to improve the mastery level of various skills and enhance the overall level of basketball skills.

(2) Pay attention to the application of the transfer rules of both limbs, arrange some exercises to strengthen the weak side limbs in class and after class, and the teaching process should be from easy to difficult, from the weak side limbs learning to the strong side limbs practice order to strengthen the balanced development of both limbs.

(3) The transfer rules should be reasonably integrated into the whole process of basketball teaching, and the transfer rules should be used to strengthen the learning effect, so that students can master more basketball skills and skills in limited time, and achieve the goal of optimizing the teaching process and improving the quality of teaching.

References

[1] Zhang Ban. Reflections on the Training of the Weak Side Hand for Youth Basketball Players Sports Goods and Technology, 2018.

[2] Du Conglong. Application Research on the Transfer of Lateralization in the Teaching of

Basketball General Courses in Ordinary Colleges and Universities in Shong Province. Journal of Qufu Normal University, 2017.

[3] Zhang Chao. Experimental Research on the Training of Weak Side Hand Ability for Youth Basketball Players of Different Ages. Journal of Northeast Normal University 2016.

[4] Chang Kun. Research on the Training of Weak Side Hand Techniques in Basketball Teaching Practice. Journal of Nanjing Sports Institute, 2015.

[5] Hicks, R.E. Injury and Illness in World Taekwondo Junior Athletes: Epidemiological Study. International Journal of Environmental Research and Public Health, 2021, 18(4).

[6] Taylor. Research the Development Process and Countermeasures of Taekwondo Poomsae. International Journal of Social Science and Education Research, 2023, 4(1).

[7] Hart. Research on the Problems Needing Attention in Taekwondo Teaching. Frontiers in Educational Research, 2020, 3.0(15.0).

[8] Swift, E.J. A Brief Analysis of the Factors Affecting Teaching Quality Taekwondo Teaching in Colleges and the Countermeasures. Frontiers in Sport Research, 2020, 2.0(8).

[9] Wang Yucan. Research on the Effect of Contralateral Transfer Training on the Learning of the One-Handed Overhead Shot Technique. Journal of Nanjing Normal University, 2018.

[10] Zhang Ning. Experimental Research on the Development Model of Weak Side Hand and Its on Improving Youth Basketball Technology. Journal of Jiangxi Normal University, 2016.

[11] Dang Huiling. Experimental Research the Practice of Weak Side Hand in Amateur Youth Tennis Training. Journal of Beijing Sports University, 2015.

