



Experimental Research with Combination of Whole Brain Teaching and Basketball Techniques

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ABSTRACT

This paper gives exploration on the whole brain teaching of techniques and tactics by aiming at basketball teaching of middle school, and it makes analysis and discussion by conducting whole brain teaching experiment on techniques and tactics, with the expectation of providing some theoretical and practical references to the whole brain teaching of basketball techniques and tactics of middle school. In the experiment, it mainly gives comparative analysis to experimental group and control group from such aspects as skills test, statistics of the left-right limb-dominated tactics coordination in game and shooting number after learning. According to the teaching experimental research, it draws the conclusion that: whole brain teaching can promote not only the grasping of basketball techniques by students but also the grasping of inferior-side tactics coordination by students, and it can increase the choice opportunities of tactics coordination and enhance the chance of victory in game.

Key Words: Whole Brain Teaching, Basketball, Tactics Coordination, Basketball Techniques

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240

Introduction

The concept of "Whole Brain" was firstly proposed by Ned Hermann – American brain expert (Nakagawa *et al.*, 2014) who divided the human brain into four parts: upper left brain for analysis, lower left brain for organization, upper right brain for discovery, and lower right brain for sharing. He proposed that the brain use in true healthy sense should be full start of the up and down, left and right brains to reach full balanced use of the four and exert function of the whole brain, and he designed "Whole Brain Teaching and Learning Model" (Handayani *et al.*, 2017) and "Whole Brain Creation and Innovation Model" according to exertion of the complementation and coordination function of left and right two brains. It can be seen that whole brain teaching (as shown in Figure 1) is the efficient teaching based on the whole brain and by exerting all advantages of the brain, and teaching method, teaching process and teaching activity designed by teacher

shall all base on the whole brain to adapt to different ways of thinking and different learning styles of students and to ensure training and promotion of the whole brain. It was discovered by VAG Torio that the academic performance and motivation with positive impact can be realized by taking WBT as teaching strategy (Torio, 2016), and it was believed by D Santoso that spirit and wisdom of English writing of students can be promoted by adopting whole brain learning strategy (Santoso, 2016). Xu Benli- scholar of our country proposed the concepts of "Whole-brain Sports Teaching and Training Method", "Whole-brain Sports Education" and "Whole-brain Sports Education Mode" firstly at home and abroad, and set up the key scientific research subject of sports and health in the schools nationwide during the ninth Five-Year plan and the 2002 key subject of the "10th Five-years" plan of the national science of education (key subject of the Ministry of Education) successively, implementation of this

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teaching mode was in four stages and lasted for about ten years, and finally the set of teaching system of “person-article-machine whole-brain teaching and training method” from kindergarten to college was formed gradually. In recent years, along with gradually deepening of the scientific research on brain and continuous boom of the research on brain science in various countries (Kim *et al.*, 2016), our country obtains many important achievements in the sports field (Thompson *et al.*, 2016). The two-side migration existed in the sports skills learning process refers to that another side limb can grasp the same sports skill without special practice after one side limb should have learnt some sports skill (Prichard *et al.*, 2014). However, in the practice, sports skills learning of student is realized by the superior side limb for the habitual effect over time, while it is very little to migrate the sports skills to the inferior side limb. It is indicated by numerous literatures that the migration effect of alternately training of two-side limbs shall be apparently higher than the training effect of merely one-side limb (Raza *et al.*, 2016). Some articles also refer to the empirical research by taking two-side migration as a teaching method (Milovanovic *et al.*, 2015), and point out that two-side migration has facilitation to sports skills of student, development of coordination, sport injury prevention and reduction and learning interest cultivation (Kobayashi *et al.*, 2016). Two-side migration of sports skills is a part of the whole brain teaching content, and it has positive effect on teaching promotion in the sports teaching practice (Gooijers *et al.*, 2014).



Figure 1. Whole brain teaching

Currently, our country is promoting the quality education gradually, which requires to conduct continuous innovation in teaching, use achievements of human civilization for reference, explore new teaching method and give course

reform. Being as the students in sports specialty, we shall realize that the traditional sports teaching is far from the ideal effect, and we shall add some new materials to the sports teaching and conduct exploration in the sports teaching practice, to seek for the realization of better teaching effect. The theoretical research on whole brain teaching based on neuroscience theory in this paper is explored in the teaching practice of basketball technique and tactics, it is the exploration adapting to the national need of promoting quality education and course reform and with the purpose of realizing sports teaching method transformation, and it has certain practical significance in supplementing the source reform theory.

Methods

This research selects 60 students choosing the optional course of basketball in some middle school as experimental subjects of the teaching, the teaching on the techniques of superior-side and opposite-side limbs and the basic attack tactics (with proportion 5:5 in the teaching) is given to the experimental group, while the teaching on superior-side limb is given to the control group merely, and statistical analysis is given to the data indicators after the experiment.

To know the basic information of basketball techniques grasping by the students in experimental group and control group after experiment, it needs to give evaluation on fixed point shooting, full-court dribbling, layup, shuttle running and ball passing and catching, as well as the grasping of ball passing action techniques. According to basketball skills assessment standard of this school, ten-point system is used in scoring, as shown in Table 1 below:

Evaluation standards for shooting and dribbling are same as above. Grasping of the basic attack tactics coordination of the students in experimental group and control group can be reflected by the counted times of different coordination adopted in the game, and the indicators needing to be counted are as shown in Figure 2, of which the counts of coordination include the four items of ball pass-and-go, breakthrough with ball holding and separating, side screen and support by coordinated action.

Table 1. Evaluation standards for ball passing techniques

Technical evaluation standard	Hand pass	Performance of technical evaluation
Excellent	The hand is correct, the passing movement is coherent, the ball is coordinated and the pass is accurate	7-10
Standard	The hand type is more correct, the action is consistent, the force sequence is correct, the pass is more accurate	4-6
Poor	Incoherent movements of unskilled dribble, poor ability to control the ball, uncoordinated force	0-4

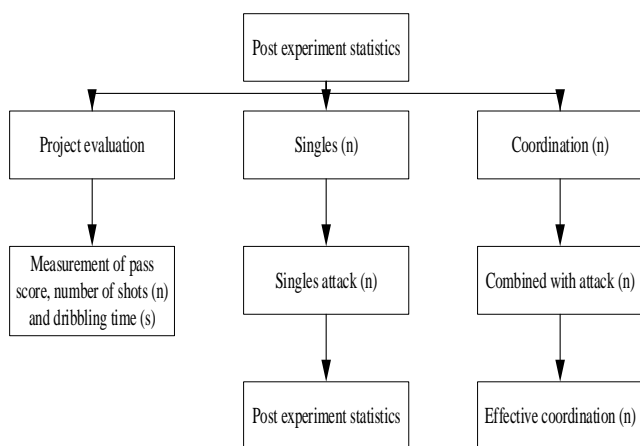


Figure 2. Statistical indicators after experiment

During the process of video watching, it needs to give judgment to each coordination appeared, to determine whether this coordination attacks the basketry and gets scores and whether it belongs to superior-side coordination or inferior-side coordination. Simultaneously, it needs to give judgement to each singles appeared, to determine whether this singles attacks the basketry and gets scores. After video watching, statistical summary shall be given respectively.

Results and discussion

Contrastive analysis on coordination and singles of experimental group and control group after teaching experiment

It can be seen from Table 2 that the statistics of attack tactics coordination of the students in

Table 2. Independent samples T Test of attack coordination and singles of experimental group and control group

Variable	Group	Match	Average value	Maximum value	Minimum value	The value of T	The value of P
Coordination	Experience group	8	41.50±2.73	46	38	0.000	1.000
	Control group	8	41.50±1.41	43	39		
Singles	Experience group	8	22.38±2.07	25	19	-3.530	0.003
	Control group	8	25.50±1.41	28	24		

Table 3. Independent samples T Test of inferior-side and superior-side coordination of experimental group and control group after experiment

Variable	Group	Match	Average	Maximum	Minimum	T value	P value
Coordination	Experience	8	41.50±2.73	46	38	0.000	1.000
	Control	8	41.50±1.41	43	39		
Disadvantaged side coordination	Experience	8	14.50±1.93	18	12	4.731	0.001
	Control	8	10.88±0.99	12	10		
Dominance side coordination	Experience	8	27±2.33	31	24	-3.394	0.004
	Control	8	30.63±1.92	33	28		

experimental group and control group shows no difference, while the counts of singles show obvious difference (with P value less than 0.05). In the condition that superior-side coordination is unsuitable, the students in experimental group may try to create the condition for inferior-side coordination, while the students in control group may select singles, and the patience of the students in game may have relation with this situation, thus the further research shall be needed.

Contrastive analysis on inferior-side and superior-side tactics coordination of experimental group and control group after teaching experiment

It can be seen from Table 3 that the statistics of superior-side coordination of the students in experimental group and control group shows obvious different (with P value less than 0.05), the statistics of inferior-side coordination of the students in experimental group and control group shows obvious different (with P value less than 0.05), and the statistics of coordination of the students in experimental group and control group shows no obvious difference (with P value greater than 0.05). By combining with the average value, it can be seen that inferior-side coordination of experimental group is more than the control group obviously, and it is opposite as to the inferior-side coordination, which indicates that the whole brain teaching promotes inferior-side tactics coordination grasping of the students.



Contrastive analysis on inferior-side coordination of experimental group and control group after teaching experiment

It can be seen from Table 4 that the students of experimental group and control group show obvious difference in inferior-side ball pass-and-go, breakthrough with ball holding and separating, screen and full coordination (with P value less than 0.05), which indicates that the whole brain teaching promotes inferior-side tactics coordination grasping of the students, especially for the coordination in ball pass-and-go, breakthrough with ball holding and separating and screen, for the training on inferior-side coordination can prompt the brain to form the memory on action coordination. Coordination in the support by coordinated action of the two groups shows no obvious difference (with P value greater than 0.05), which may have relation with learning time and grasping proficiency of the students.

Contrastive analysis on superior-side coordination of experimental group and control group after teaching experiment

It can be seen from Table 5 that the students of experimental group and control group show obvious difference in superior-side screen and full coordination, and they show no obvious difference in the coordination in ball pass-and-go, breakthrough with ball holding and separating and the support by coordinated action (with P value greater than 0.05). Moreover, it can be seen from the average value that applied statistics of superior-side coordination of experimental group is less than the control group, while the difference is not big, which indicates that the whole brain teaching on the students in experimental group has little influence on their learning on superior-side ball pass-and-go, breakthrough with ball holding and separating and the support by coordinated action. However,

the statistics on superior-side coordination of experimental group and control group shows obvious difference (with P value less than 0.05), mainly for the students in experimental group have more tactics coordination selections.

Contrastive analysis on comprehensive statistics of experimental group and control group after teaching experiment

Table 6 shows the comprehensive statistics on singles and coordination of experimental group and control group, including coordination, attack with coordination, shooting with coordination, inferior-side shooting with coordination, superior-side shooting with coordination, singles and shooting statistics of singles, and the data of shooting, attack times and shooting percentage in game are obtained thereof, thus analysis can be given to the influence of coordinated attack on the shooting percentage. Experimental group and control group show no obvious difference in superior-side shooting with coordination and the shooting in singles (with P value greater than 0.05), which indicates that it does not need to consider the influence of such factors as physical ability, psychological factor, defence and sports intelligence of the students of experimental group and control group on the shooting in game. The two groups show obvious difference in inferior-side shooting with coordination (with P value less than 0.05) and in shooting number and shooting percentage in game, which indicates that tactics execution (coordination selection) of students can affect the shooting percentage in game to some extent, and the more selections in attack tactics coordination may result in the higher shooting percentage. Therefore, it can be obtained that whole brain teaching can increase selection of the students in attack tactics coordination in game, further enhance the shooting percentage, and finally promote the probability of victory in game.

Table 4. Independent samples T Test of inferior-side coordination of experimental group and control group

Variable	Group	Match	Average	Maximum	Minimum	T value	P value
The weak side cut	Experience	8	5.88±1.25	8	4	2.743	0.016
	Control	8	4.38±0.92	6	3		
Disadvantaged side process	Experience	8	3±0.76	4	2	2.646	0.019
	Control	8	2±0.76	3	1		
Disadvantaged side cover	Experience	8	4.25±0.71	5	3	2.828	0.013
	Control	8	3.25±0.71	4	2		
Weak side support	Experience	8	1.38±0.74	2	0	0.344	0.736
	Control	8	1.25±0.71	2	0		
Disadvantaged side coordination	Experience	8	14.50±1.93	18	12	4.731	0.001
	Control	8	10.88±0.99	12	10		



Table 5. Independent samples T test of superior-side coordination of experimental group and control group

Variable	Group	Match	Average	Maximum	Minimum	T value	P value
The weak side cut	Experience	8	11.50±1.20	13	9	-1.643	0.123
	Control	8	12.38±0.92	14	11		
Disadvantaged side process	Experience	8	7±0.93	8	5	-1.594	0.133
	Control	8	7.88±1.25	10	6		
Disadvantaged side cover	Experience	8	5.63±0.75	7	5	-2.688	0.018
	Control	8	6.63±0.75	8	6		
Weak side support	Experience	8	2.88±0.99	4	1	-2.033	0.061
	Control	8	3.75±0.71	5	3		
Disadvantaged side coordination	Experience	8	27±2.33	31	24	-3.394	0.004
	Control	8	30.63±1.92	33	28		

Table 6. Independent samples T Test of comprehensive statistics of experimental group and control group

Variable	Group	Match	Average	Maximum	Minimum	T value	P value
Coordination	Experience	8	41.50±2.73	46	38	0.000	1.000
	Control	8	41.50±1.41	43	39		
Match the attack	Experience	8	29.63±5.26	37	24	1.814	0.091
	Control	8	25.13±4.64	32	19		
Match the hit	Experience	8	12.63±1.30	14	11	2.338	0.035
	Control	8	11.25±1.04	13	10		
Disadvantaged side with the hit	Experience	8	7.75±2.49	12	4	2.220	0.043
	Control	8	5.50±1.41	8	4		
Predominance side matching	Experience	8	17±3.21	22	12	0.000	1.000
	Control	8	17±3.02	22	14		
Singles	Experience	8	22.38±2.07	25	19	-3.530	0.003
	Control	8	25.50±1.41	28	24		
Singles hit	Experience	8	5±0.76	6	4	0.683	0.506
	Control	8	4.75±0.71	6	4		
Score	Experience	8	35.25±2.12	38	32	3.052	0.009
	Control	8	32.00±2.14	36	30		
Shooting	Experience	8	17.63±1.06	19	16	3.052	0.009
	Control	8	16.00±1.07	18	15		
Number of offense	Experience	8	52.00±3.93	57	47	0.892	0.387
	Control	8	50.38±3.34	55	46		
Shooting rate of competition	Experience	8	33.93±0.84%	35.42%	32.73%	3.061	0.008
	Control	8	31.80±1.78%	34.78%	29.09%		

Conclusion and prospect

When giving contrast to the students of experimental group and control group after experiment, it can be seen that whole brain teaching could promote inferior-side tactics coordination grasping of the students, while it has no obvious influence on the superior-side tactics coordination grasping. Moreover, the whole brain teaching can increase the chance for tactics coordination selection and then enhance the probability of victory in game, and it can promote the basketball techniques grasping of the students to some extent. Content of whole brain teaching has close relation with the development of left and right brains, the training on left and right-side limbs is a small part of the whole brain teaching, and such items as combination of multimedia presentation and logical analysis are embodiments of whole brain teaching which need to be explored by us in the practice. As for the

grasping of exploration method, content and results, further practical demonstration shall be needed.

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