Evaluation of Table Tennis Skills Based on Whole Brain Teaching

Yucheng Zhou

ABSTRACT

To study the table tennis technique assessment in the whole brain teaching, two classes of 2007 in Xuzhou Medical College were taken as the research objects. From the perspective of sports technology teaching, this paper studies the effect of the whole brain teaching on the table tennis scores through teaching. The results show that after learning the skills, the students in the experimental group achieved a significantly higher score than the control group in terms of both forward and backward techniques and standard test scores. It indicates that in the whole brain teaching, consciously strengthening the weak side limb technique of the experimental group is beneficial to master the dominant side limb movement skill, thereby improving the performance in the table tennis examination.

Key Words: Whole Brain Teaching, Table Tennis, Forward and Backward Techniques, Limb Motion

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Introduction

Table tennis is popularly elected in college physical education. Its teaching purpose is to train and inspire students' interest in table tennis, enhance their physical fitness, and make table tennis become an important part of students' lifetime sports. In traditional table tennis teaching, teachers are only used to training students' dominant limbs and ignore training the vulnerable one. If a person always plays table tennis by one hand, this hand is flexible, and the other one will seem clumsy. Therefore, the circumference difference of the left and right upper arm and forearm is easy to become relatively large, and excessive unilateral exercise can also cause scoliosis. Even the body on both sides will have a tendency of deformation. It can be seen the traditional table tennis teaching cannot meet the need of training all-round development of the intellectual. Hence, it is necessary to seek a new teaching method to adapt the current quality education. The concept of "whole brain" was originally introduced by the American brain expert Ned (Nakagawa *et al*., 2014). Herrmann has proposed that he has divided the human brain into four parts: the left upper brain is used for analysis, the left lower brain is used for organization, the upper right brain is used for discovery, and the right lower brain is used for sharing. He put forward that in the real sense of brain health, four parts of the brain should be fully activated to stay in balance, and then the function of the entire brain will be achieved. He designed a "whole-brain teaching and learning model" (Handayani *et al*., 2017) and a "whole-brain creative and innovative model" based on the complementary and coordinated functions of the left and right hemispheres.

It can be seen that the whole brain teaching is based on the whole brain and uses all the advantages of the brain to effectively teach. The teaching methods, teaching process, and teaching activities designed by teachers must be based on the whole brain to adapt to students' different ways of thinking and leaning style, so as to make sure the whole brain gets trained and

Corresponding author: Yucheng Zhou
Address: Chongqing Jiaotong University, Chongqing 400074, China
e-mail ✉ 11809yczhou@126.com
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improved. Whole Brain Teaching has no unified definition and different scholars have different opinions. Me Cathy points out that the whole brain is a teaching method that develops multiple learning styles (Alghraibeh, 2015). It is a teaching method that combines left and right brains in learning. This teaching transfers information equally to both hemispheres whose advantages will be taken. And the American scholar Sue Leonard believes that the Whole Brain teaching method is based on the whole brain and uses the full advantages of the brain to teach students. The teaching methods, teaching processes, and teaching activities must be based on the whole brain to fit students' different ways of thinking and learning styles and all these ways should ensure that the whole brain is trained and improved. VAG Torio has found that positive academic performance and motivation can come from WBT as a teaching strategy (Torio *et al*., 2016). Santoso improves the mental intelligence of students' English writing through the whole brain learning strategies (Santoso, 2016). Marina Kirstein uses Herrmann's model for teaching accounting to determine if the learning style's flexibility is accommodated in learning, which is beneficial for Marina's teaching (Kirstein, 2016). Widodo Winarso also finds that a positive correlation between whole-brain teaching and students with mathematical creativity (Winarso *et al*., 2017).

With the gradual deepening of brain science research, the upsurge of studying brain sciences in countries around the world has been rising in recent years (Kim *et al*., 2016). Many important achievements have also appeared in China's sports field (Gabitov *et al*., 2017). However, the results of these studies are generally the development of learners' brain potential (Thompson *et al*., 2016). Although the whole brain education strategy has been implemented, the study that if the dominant limb (usually the right side) will change is rare. Therefore, this study effectively combines brain science research and physical education teaching. From the perspective of sports technology teaching, it focuses on implementing the whole brain teaching strategy under the premise that the potential of brain and both hands is achieved, and finally figures out the mastery condition of the dominant limb. The purpose of this study is to find a feasible method of table tennis teaching to meet the needs of quality education.

Methods

The experimental section

30 male students of 2007 clinical department of Xuzhou Medical College formed the experimental group, and 30 male students in the pharmacy department were the control group. There was no left-handed person in both groups. And both groups used multi-ball training during the class to help students grasp the basic skills of table tennis, correct wrong movements, and promote technical dynamic stereotypes. Backhand push, forehand attack and other related technical teaching and theoretical teaching are carried out at the same time. The specific group teaching method is shown in Figure 1.

The first semester technical assessment contents are backhand hit, forehand stroke, and flat hit. And the content of the target assessment are as follows: the number of backhand consecutive hit, the forehand consecutive hit (all for ordinary spin ball and the test assistant teacher should be a two-level table tennis player). The times of a student hits the ball after a fault is his score and each student has two chances to get the best score. During the second semester, technical evaluation contents are backhand shot, forehand shot and underspin ball playing. The assessments are as follows: backhand consecutive shots, forehand continuous shots for 50 times (all for ordinary spin ball, and the test assistant teacher should be a two-level table tennis player). Standards for technical and compliance assessment are shown in Table 1.

The technical assessment team is composed of teachers from the balls department. These teachers have professional skills in table tennis. The team employs the "single-blind method" to score each student's technical skills and achievement standards to ensure the reliability and objectivity of the assessment. The first semester is evaluated as follows: total score = 70% standard score + 30% technical assessment score where each of the three technical evaluations accounts for 1/3 of the technical evaluation scores, and each of the two compliance assessments accounts for 50% of the achievement. And during the second semester, the formula is: 60% standard score + 40% technical assessment score and the calculation method of technical assessment score and achievement criterion is the same as the first semester.

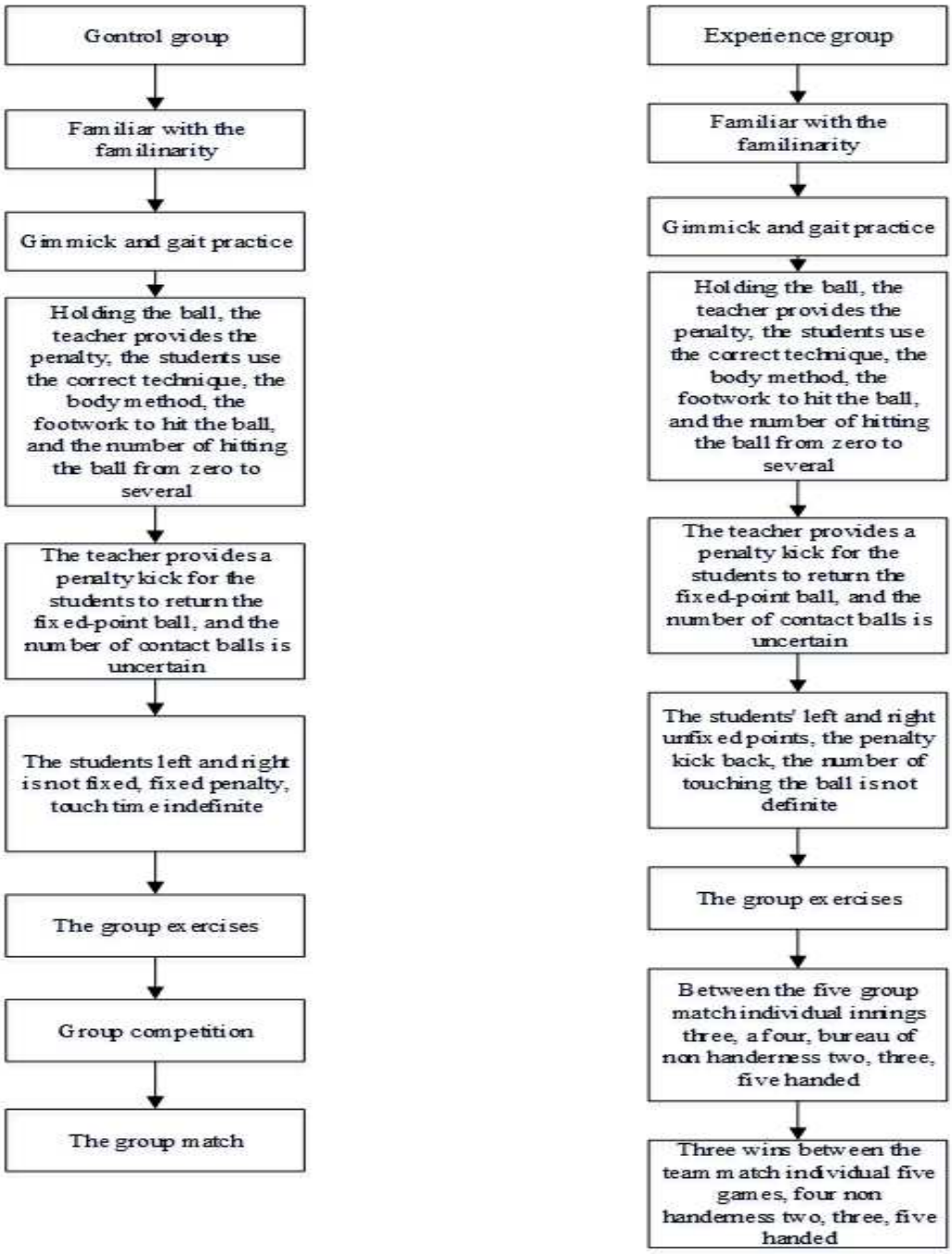

Figure 1. Group teaching

Table 1. Standards for technical and compliance assessment

Technical evaluation			Standard evaluation		Achievement
Action	Coordination	Ball control ability	Stroke number stroke	Ball time/s	
Correct	Good	Strong	>45	<50	90-100
More correct	Better	Stronger	37~45	50~58	75~89
Basically correct	General	General	30~36	59~70	60~74
Incorrect	Difference	Difference	<30	>70	<60

Results and discussion

Comparison of two-semester assessments between the experimental and the control group

Table 2 and Table 3 show that through a semester of table tennis learning, the scores of technical evaluation and the number of hitting backhands of two groups of students increased significantly. However, the experimental group makes greater progress: their technical assessment has the "more correct action, better coordination and

Table 2. Comparison of technical assessment results

Semester	Evaluation content	Experience group	Control group	P
First semester	Backhand stroke technique score	78.21±4.01	72.36±4.62	0.000
	Scoring of forehand stroke	77.65±4.69	71.96±4.13	0.000
	Score of flat hitting Technology	85.54±4.32	80.98±4.13	0.004
Second term	Backhand stroke technique score	87.21±3.91	82.36±5.12	0.000
	Scoring of forehand stroke	86.65±4.29	81.66±5.13	0.000
	Score of flat hitting Technology	88.54±3.32	84.98±4.13	0.000

Remark: P<0.01

Table 3. Comparison of the times of hitting backhands in the first semester

Evaluation content	Experience group	Control group	P
Backhand stroke technique score Scoring of forehand stroke	46.31±4.15	40.95±4.83	0.000
Backhand stroke technique score Scoring of forehand stroke	45.61±3.15	39.15±4.73	0.000

Remark: P<0.01

Table 4. Comparison of 50 times of consecutive hit in the second semester

Evaluation content	Experience group	Control group	P
Backhand stroke time /S	54.32±3.65	60.95±4.23	0.000
Forehand stroke time /S	54.69±3.75	61.15±4.73	0.000

Remark: P<0.01

Table 5. Comparison of the two semester assessments

Tab.5	Comparison of total	Score for two terms	
Semester	Overall assessment		P
	Experience group	Control group	
First semester	86.36±4.19	78.87±6.53	0.000
Second term	85.36±6.09	79.00±9.63	0.000

Remark: P<0.01

strong ball control ability". Both of their technical evaluation and standard assessment are highly significant compared with the control group.

Table2 and Table 4 indicate that after two semesters' learning, the technical assessment results of two groups have been relatively high, that is, the students have reached the level of "more correct action, better coordination, and stronger ball control ability". Even though the standard assessment is more difficult than the first semester, the experimental group still achieves higher grades than that of the control group and the result is highly significant. The assessment results in Table 5 further illustrate that the experimental group is superior to the control group and the difference is highly remarkable.

The non-dominant hand can improve the dominant one's skill

From the experimental results, it can be seen that the performance of the experimental group was significantly improved compared with the control group after they used the non-dominant hand to cooperate with the dominant one in the basic table tennis exercise. When the right and left limbs intersect with the left and right brains, the non-dominant hand actually stimulates the left sensory and right brain reflexes, which helps the practitioner to master the technical movements faster, more comprehensively, and more skillfully. This proves that when the two limbs learn the same skill and one of them has undergone certain exercise, a specific "cognitive structure" will be formed in the brain. The structure will affect the other limb's earning, that is, the strengthening of the original weak side of the limb technical movements can significantly improve the strong side's movements. From the perspective of cognitive psychology, since the human body is unified as a whole, the movements of the limbs can not only improve the skills of the same side limb, but also the mechanisms that affect each other through the movement skills will also promote the other limb through the influence of skills, thus improving the body's overall athletic ability.

Whole Brain teaching inspires students' innovation potential

It can be seen from the experiment that the students in the experimental group require a higher ability to coordinate their hands, eyes and brain when they exercise the non-dominant hand (the left hand), so that the corresponding side of the brain can be developed better than that in the dominant hand training. After a certain times of

left-handed exercises, the right limb and left cerebral nerves are fully relaxed and adjusted. Also, the left limb and the right cerebral cortex nerves are stimulated, the blood circulation is accelerated, and the brain is more exciting. All these changes will guide students to get the inspiration of technological movement and experience in learning, expand students' thinking and promote the improvement of students' creative potential. An introduction to whole-brain teaching is shown in Figure 2.

Figure 2. Introduction to whole brain teaching

Whole-brain teaching is essential for promoting the concept of lifelong sports for students

Table tennis is a combination of hands and brain. It is difficult to combine movements and tandem movements because playing table tennis is both physical coordination and brain thinking. If we put the whole brain teaching into college table tennis class and carry out purposeful teaching according to students' actual situation and their aptitude, the main role of students will be fully given, the interest of the classroom will be increased and class atmosphere will be more active. Therefore, students actively participate in the study and constantly update and strengthen themselves. It is helpful to stimulate students' right brain potential, cultivate students' good quality of overcoming themselves and have interest in table tennis. Finally, they can consider the table tennis as their way of exercise in college and even after graduation, which will promote the idea of lifelong physical exercise.

Conclusion and prospects

Students in the experimental group have better back-to-backhand skills and test scores than the control students. This shows that adopting the whole brain approach in table tennis teaching can optimize the teaching process and speed up the process of skills learning, basically reflecting the feasibility and the effectiveness of teaching methods. Facts have proved that non-dominant hand training is conducive to the mastery of the dominant hand movements. Therefore, in the training of professional table tennis teams, the whole brain teaching mode can be selected. During teaching, the objects should be divided according to progressive relationships with factors such as special sports skills of table tennis and physical fitness. The application of whole brain teaching in table tennis has certain reference value for the teaching of other small balls.

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