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Research on Training Method of Leg Technique Movement in Breaststroke Teaching

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Abstract: ***The breaststroke kick, or "whip kick," is the primary source of propulsion in breaststroke, contributing an estimated 70-80% of the forward momentum. However, its complex, asymmetrical, and non-linear motion makes it the most technically challenging element to master. This paper researches and outlines a systematic training methodology for breaststroke leg technique, moving from foundational dry-land drills to advanced in-water integration. The focus is on developing a kinesthetic understanding of the proper "catch," propulsion, and recovery phases while identifying and correcting common errors.***

Keywords: Breaststroke teaching; Leg technique; Training methods.

1. INTRODUCTION

In breaststroke teaching, students' leg techniques are a key part that has a significant impact on the ability of leg muscle groups, while leg techniques have a certain degree of influence on athletes' physical fitness. Therefore, by comparing the foot exercise methods under traditional teaching mode with modern teaching mode, it is found that there are significant differences between the two, and corresponding solutions can be taken to improve students' leg muscle strength and overall explosive power in breaststroke specialized learning. At the same time, it can also promote the development of the whole body skeletal muscle group.

2. DECOMPOSITION OF LEG TECHNIQUES IN BREASTSTROKE

The leg techniques of breaststroke can be divided into four parts: leg contraction, eversion, kicking, and gliding.

Leg retraction is the preparation and closure stage for eversion and kick clamp. When closing the legs, no thrust is generated, but a certain amount of resistance is formed. Therefore, in the teaching of closed leg technique movements, reducing resistance is the focus of teaching. Due to rowing and breathing, the hip, thigh, and knee joints should slightly sink at the beginning of leg retraction. Bend your knees and hips while retracting your legs, keep your knees together, gradually extend your ankle joint, and keep your calves and heels behind your thighs and hips, effectively reducing the resistance of leg retraction. When the foot approaches the hip position, stop the leg retraction and complete the entire leg retraction.

Outing and kicking are continuous movements that cannot be interrupted. After retracting both legs, the feet should be lifted and turned outward, the knee joints should be turned inward, and the lower legs should form a 90° angle with the water surface as much as possible. After completing the action, push hard. At the same time, the legs and thighs should be tightly clamped to complete the entire outward rotation and pedaling action. In order to improve driving force, the calves and feet must be at right angles to the water when turning and stepping. In the teaching of breaststroke, the characteristic of the kick clamp is that the kick route is long, which can fully utilize the strength of the hip and thigh muscles. In breaststroke, the speed of the body and legs is faster, but the amplitude of the feet is smaller.

After completing the outward turning and kicking movements, the body slides forward under the reaction force of the water. During the gliding phase, raise both feet to a height parallel to the water surface to reduce the impact of water resistance on forward driving force. During the sliding process, the legs should be close and straight, and the leg muscles and ankle joints should naturally relax to prepare for the next leg contraction.

3. ANALYSIS OF LEG TECHNIQUE MOVEMENTS IN BREASTSTROKE TEACHING

3.1 Research on the relationship between thighs and torso

In breaststroke teaching, teachers should delve into the relationship between thighs and torso to help students master the key points of leg movements. In breaststroke leg technique, during the preparation stage of leg technique, the angle between the thigh and torso increases, and the knee joint bending angle decreases. Some students have a large angle between their torso and thighs. In this posture, the kicking of the legs mainly depends on the strength of the knee extensor muscles, especially the quadriceps. If the angle of thigh bending is large, although the resistance is high, balance can be achieved by kicking and actively participating in thigh extensor muscles to counteract leg resistance. When the angle between the thighs and torso reaches 90 degrees, the resistance of water to the legs is the greatest, and the hindering force is difficult to compensate for. Therefore, in breaststroke teaching, we should try to avoid incorrect movements such as excessive angles between legs and torso.

3.2 Analysis of breaststroke leg retraction technique

According to the theory of fluid mechanics, when closing the legs in breaststroke technique, the following four points should be noted:

(1) Try to shorten the range of motion of the hip and knee joints as much as possible, and use the strength of the abdominal and thigh muscles to perform a curved whip kick. At the end of kicking, pay attention to relaxing the leg muscles to bring the calves closer to the water surface as soon as possible, reducing the obstruction of water on kicking progress;

(2) When retracting the legs, the hip joint angle should be controlled between 130° and 140°, and the lower leg should be perpendicular to the water surface to maintain coordination between the trunk and lower limbs and reduce the blocking force generated during pedaling;

(3) When kicking, the thigh narrows under the push of the calf, and the lower part of the knee joint should be slightly wider than the thigh to reduce the resistance generated by the thigh;

(4) Kick the leg with force and consistency. The greater the acceleration force, the longer the sliding distance.

3.3 Analysis of Kicking Techniques

In the technical action of kicking, the kick clamp is a continuous movement. If the kick clamp is separated or kicked first and then clamped, the effect of the kick clamp will not be significant. The reason is that during the process of shifting from the pedal to the clamping, the pedal clamping speed is low and the water resistance is high, resulting in a deviation in thrust and resistance. Therefore, in breaststroke teaching, teachers should guide students to pedal and clip simultaneously, with pedaling as the main and clip pedaling as the auxiliary, to ensure a large water holding area throughout the entire pedaling technique.

Key points of breaststroke leg training. In the teaching and training of breaststroke leg techniques, teachers should pay attention to the teaching and guidance of leg retraction and gripping techniques, improve the standardization and normalization of students' leg techniques, and reduce the formation of incorrect movement habits. Teachers should guide students to maintain a small distance between their two knee joints, keep the width of the inner side of the knee joint consistent with that of the inner side of the hip joint, and try to avoid bending the lower leg as much as possible; When retracting the legs, the speed should be consistent with the swimming speed of the torso; When the leg is retracted, the knee joint should bend inward.

4. RESEARCH ON TRAINING METHODS FOR LEG TECHNIQUES IN BREASTSTROKE TEACHING

4.1 Leg technique training content in breaststroke teaching

(1) In breaststroke teaching, body exercises are the main method, while leg technique training is auxiliary.

From the perspective of sports anatomy, there are certain differences in the structure and function of human muscles. Therefore, it is divided into three stages: beginner stage, consolidation stage, and improvement stage; Based on the different characteristics of the first two periods, breaststroke technique movements can be divided into four stages (including basic stride and step) for analysis and research, and the skills required to pay attention to and complete tasks in these steps can be further improved to enhance leg strength training methods and content.

(2) When performing leg exercises, it is necessary to first develop a complete and scientific training plan based on the requirements of the teaching syllabus and specific situations.
By adjusting the position relationship of muscles and joints in various parts of the body, as well as the amount of exercise, students can correctly and reasonably complete various leg movements. At the same time, it should be noted that due to students' limited abilities and inability to proficiently use various leg techniques, it is necessary to strictly follow the textbook content and technical specifications for practice.

4.2 Training Method System for Leg Techniques in breaststroke Teaching

(1) Leg techniques in breaststroke teaching

Through observing students' squatting, standing, and posture, it was found that the pre learning stage of breaststroke is the most fundamental and important exercise period for leg muscle strength. During this stage, teachers should guide students to correctly and reasonably grasp their toes and let them stretch naturally. At the same time, attention should be paid to controlling the distance and contraction time between the force point and the leg after pressing the button, in order to ensure the smooth completion of leg movements.

(2) The content of action training methods

In breaststroke teaching, basic footwork, leg jumping, and supine position are mainly used for exercise techniques practice. The most important of these is leg muscle strength, so athletes can improve their explosive power and endurance by adjusting the flexibility of muscle groups and joints in various parts of their bodies; Secondly, there are corresponding training contents in leg technique exercises, sit up posture exercises, leg swing training methods, and breaststroke leg attack teaching. At the same time, it is also important to make reasonable arrangements without affecting one's own performance.

4.3 Characteristics of leg techniques in breaststroke teaching

(1) Strong muscle contraction ability; Muscle fibers, capillaries, and other parts of the body are the main sources of respiratory power and energy expenditure.

Due to the unique rhythm of breaststroke, its explosive power is also many times greater; In addition, through the decomposition of different stages of exercise projects, it was found that their characteristics are: in the anterior body movement, the leg joints are in the core position and in the middle state.

(2) During the learning of leg techniques, students mainly focus on their body parts as the axis and main line of movement.

Compared with other sports, breaststroke has outstanding flexibility and jumping ability, good balance, and strong explosive power; At the same time, it also has the advantages of high stability, low susceptibility to injury, and no need to persist in training movements for a long time.

(3) Accuracy and coherence of actions.

The breaststroke technique has its unique features. During the movement, each joint has its own independent position, and the various parts are interconnected and closely coordinated. The legs are flexible and versatile, and can effectively connect various body parts of the upper and lower limbs.

5. THE IMPORTANCE OF LEG TECHNIQUE TRAINING IN BREASTSTROKE TEACHING

For the human body, muscles are the core part of bones, commonly known as the "soul", and the most important components in the body are muscle fibers. In breaststroke, there are rich, diverse, and complex techniques and methods to complete the technical content of movements; At the same time, it can also stimulate various parts of the body from different angles to fully utilize and exert their effects, improving the leg strength and explosive power level of athletes. For the body, muscles are one of the core components that make up the bones, and also determine the level of human movement ability and whether the speed and quality are good.

In breaststroke teaching, due to the particularity of breaststroke technique movements, students need to have strong leg strength and explosive power, and completing each complete gait quickly and smoothly is a basic requirement. Therefore, there is also a high level of difficulty for students in the learning process. Horizontal hand and leg support ability requirements: Proficient in arm strength and contraction exercises, and through muscle coordination and control to achieve training in muscle group function and joint activity in various parts of the body, in order to form a good, stable, and lasting exercise state.

6. THE EXISTING PROBLEMS IN LEG TECHNIQUE TRAINING METHODS IN BREASTSTROKE TEACHING

(1) Insufficient arm strength.

For beginners, sit ups are the main training method for physical fitness and leg muscle explosive ability development; For ordinary universities, standing up, single arm lifting, and cross legged exercises are generally used to enhance students' arm endurance and balance.

(2) The practice of motor skills lacks coherence.

In breaststroke teaching, teachers often only focus on techniques and skills, while neglecting the muscle activity and coordination ability of various parts of the body. Due to students' inability to master the complete essentials of movements and exercise loads, various errors or mistakes may occur, such as not standing accurately in the correct posture, leaning forward with the feet and stepping up and down with the toes, walking forward with the arms, running and jumping, etc; Or in breaststroke teaching, there is too much randomness and the leg joints cannot stretch flexibly.

(3) Insufficient emphasis is placed on teaching breaststroke techniques.

Through research, it has been found that there is relatively little research on leg techniques and movements in sports in China. Most of them are based on traditional methods and only focus on simple, boring, and tedious aspects. In competitive competitions, legs are used as the core strength for training, which leads to a lack of motivation, interest, and enthusiasm for learning among students.

(4) The teaching content is not comprehensive.

At present, most breaststroke coaches in Chinese universities only teach leg techniques and movements to students during lectures. However, for projects with significant differences in stages, learning characteristics, and physical fitness, the courses taught are also different. For example, the key practice in swimming is "long-distance running", while in water sports, there are no requirements for technical movements such as "blocking". If compared to general sports, the teaching content is relatively monotonous, boring, and uninteresting, which can easily make scholars feel bored and lose interest.

7. IMPROVEMENT OF LEG TECHNIQUE TRAINING METHODS IN BREASTSTROKE TEACHING

For the current teaching methods, we can learn from the excellent breaststroke coaches abroad who have adopted more advanced, rational, scientific, and easy to operate technical movements in their training. For example,

footwork exercises can improve students' physical fitness and muscle strength, while also enabling them to master more comprehensive leg movement abilities, thereby enhancing their competitive level and visual appeal. Therefore, in teaching, attention should be paid to improving and innovating the training methods, and strengthening the stability exercises of students' leg joints. Through continuous practice, the coordination, flexibility, and flexibility of various muscle groups in the athlete's body can be enhanced; It should also be noted that the teaching of breaststroke should be based on the characteristics of breaststroke techniques and movements.

In breaststroke teaching, most students are beginners and do not have basic knowledge of swimming. Their land living habits conflict with the water environment, which makes it easy for students to make significant mistakes in breaststroke teaching. Based on the decomposition of breaststroke leg techniques, common leg technique errors and correction methods were analyzed.

It is easy to make mistakes and correct them during the leg retraction stage. During the leg retraction stage, common incorrect movements include flat leg retraction, hip joint elevation, and poor leg posture during leg retraction. The main reasons are that students have poor understanding of the movements during the leg retraction stage, poor physical coordination, psychological tension, or excessive force. To solve this problem, teachers can guide students to imitate and practice water sports on land first, and then train by the pool after becoming proficient - placing both hands on the ground, inserting the calf into the water, clamping the knee, closing the calf, when the heel touches the pool wall, flipping the feet outward, drawing an arc, and then straightening and closing the knee for cyclic practice.

It is easy to make mistakes and correct them during the outward rotation stage. The main mistake that is easy to make during the outward rotation stage is not turning the foot. The main reason is that some students have poor flexibility of the muscles around their knee and ankle joints, and it is difficult to turn their ankle joints out. The main reason for inadequate outward rotation is that students have not mastered the technique of turning around. For the problems of not turning over and not turning over properly, teachers can record videos of students' incorrect movements and explain in detail the reasons and correction methods for the incorrect movements.

It is easy to make mistakes and correct them during the clamping stage. During the pedaling and clamping stages, it is easy to make mistakes, mainly including pedaling the legs, pedaling the abdomen, pedaling the toes, inconsistent pedaling and clamping movements, and downward pulling of the calf. The main reason is the incorrect sequence of pedaling and clamping movements, the lack of coherence between pedaling and clamping movements, and insufficient knee joint sinking. In response to the incorrect toe water movement, teachers can grab students' feet and help them practice the water holding action, making them feel the feeling of their legs holding water. Regarding the issue of abdominal extension, on one hand, students can be guided to simulate exercises on land, allowing them to feel the correct leg retraction movement. On the other hand, it can use devices such as pool walls and short bars to avoid excessive contraction of students' thighs and guide them to retract their calves with their heels close to their buttocks.

It is easy to make mistakes and correct them during the sliding phase. The gliding stage is the final part of the breaststroke technique cycle and is the final preparation stage for leg techniques. A common mistake in this stage is entering the foot retraction phase without sliding. During the training process, students constantly retract, turn around, and pedal, which results in significant physical exertion. To solve this problem, students can be required to pause for 3-5 seconds after their feet are close and straight, in order to promote the formation of habitual movements.

8. CONCLUSION

Through the analysis of breaststroke technique movements, it can be seen that in teaching, students are able to master complete and difficult leg kicking techniques, but there are certain shortcomings in the leg joints, so teachers need to make appropriate adjustments according to their own characteristics. Firstly, it is necessary to enhance the training level of students' arm strength; Secondly, increase practice methods to improve physical fitness and muscle contraction ability; Finally, it is necessary to increase the intensity of practice and control and coordination in terms of time. In teaching, teaching tasks can be completed through various means.

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