

<sup>1</sup>Rongting Zhao

Jiwei Yao

**Research on the Method of  
Cultivating Water Sense of  
Swimming Beginners in Colleges  
and Universities  
-- A Case Study of Students in  
Nanjing Sport Institute**



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**Abstract: - Aim:** Through a 12-week water sense training for swimming beginners in Nanjing Institute of Physical Education, this paper probes into the training methods of water sense, with the aim of deepen students' empathetic of water, so as to make swimming teaching better and deeper. **Method:** In this paper, by means of the methods of literature, experiment, questionnaire, mathematical statistics and other research methods, 20 swimming beginners in Nanjing Institute of Physical Education were randomly divided into the control group and the experimental group by drawing lots for a 12-week controlled test. The experimental group received water sense training (oar paddler, static upward drift, upright top rotation, torpedo stroke), while the control group received conventional swimming teaching. **Results:** After 12 weeks of water sense training, the experimental group had better performance in all tests (treading water time, jellyfish floating time, 25m floating stroke, push off distance) than the control group ( $P < 0.05$ ). **Conclusion:** The effect of water sense training is significant. The teaching mode interspersed with water sense training in conventional swimming teaching is conducive to improving the water perception ability of swimming beginners, and thus improving the teaching quality of swimming courses in colleges and universities. At the same time, compared with the conventional swimming teaching mode, water sense exercise can arouse the interest of swimming beginners and improve their enthusiasm and initiative, which has guidance and reference significance for improving the teaching quality and teaching effect of swimming courses in colleges and universities, and speeding up the teaching progress..

**Keywords:** universities; swimming teaching; water sense exercise; training methods

Swimming is the skill of moving or advancing through water by means of body movements and the force of the water<sup>[1]</sup>. The human body has different feelings in various sports, such as the "sense of ball" of basketball and the "sense of rhythm" of gymnasts<sup>[2]</sup>. For beginners in swimming, not only do they need to have the physical qualities required by land sports, such as strength, speed, endurance, flexibility and so on, but also need to have a good sense of water pressure changes - the "water sense".<sup>[3-5]</sup>

Water sensation is a complex subjective feeling, which is not only related to the water medium in which the human body is located, but also related to the sensitivity of the human nerve conduction pathway, skin and muscle receptors. It can be understood as a special quality of swimmers, and it is also a specialized body perception<sup>[6]</sup>. Whether the water sensation of a swimmer is good or not directly affects his performance of swimming. The cultivation of water sense in swimming course teaching in ordinary colleges and universities is not only to solve the problem of students' "fear of water" psychology, nor is it only a problem of diversified teaching methods and contents, but also to effectively improve the body's perception of water in practice, so that students can recognize the relationship between "human" and "water". It is also highlighting and restoring the body-oriented consciousness that is covered by the supreme technology in project teaching. Water sense and technology affect each other and cannot be separated in practice.

With the continuous deepening of China's education system and new curriculum reform, national fitness activities are becoming more and more common. Swimming is also favored by many college students, so many colleges and universities in our country have set up swimming courses. However, due to the limitation of teaching times and interval time, teachers tend to focus on students' swimming skills and movements in teaching, and pay insufficient attention to the cultivation of students' water sense, which restricts students' enthusiasm for swimming learning to a certain extent and also has a negative impact on the learning and training effect.

In addition, at present, in the process of carrying out swimming teaching in colleges and universities, due to practical factors, it is often impossible to divide classes according to students' basic degree. Different foundations lead to differences in learning outcomes among students. Water sense is of great significance to swimming teaching in colleges and universities, and it is an important perceptual induction in swimming. For those students with poor foundation, strengthening their sense of swimming water can make them better feel the different changes (such as resistance, buoyancy and pressure) brought about by different angles in the water. It is helpful for students

<sup>1</sup>College of Physical and Health Education, Guangxi Normal University, Guilin 541006, Guangxi, China

<sup>2</sup> College of Physical and Health Education, Guangxi Normal University, Guilin 541006, Guangxi, China. Email: 15150550801@163.com

to better understand the movement and lay a good foundation for future study <sup>[7]</sup>. Strengthening the cultivation of students' sense of water can also reduce the difficulty of future teaching and improve the quality of swimming teaching <sup>[8]</sup>.

However, through the practice reflection and investigation of swimming course teaching in recent years, we find that the current test of "water sense" is mostly an empirical qualitative expression, with one-sidedness and instability <sup>[9-10]</sup>. Therefore, we need to transform the subjective evaluation of water sense into quantitative expression, which can not only provide a more scientific and objective basis for the evaluation of water sense, but also help swimming teaching to develop in a better and deeper direction <sup>[11-14]</sup>. This paper discusses the training method of water sense by comparing the teaching experiment of water sense exercise with that of the beginners who use conventional swimming teaching without water sense training. The purpose of reexamining and discussing the teaching system of swimming course is to promote the reform of swimming course teaching, deepen students' understanding of water, and improve the learning and training effect of swimming course.

## 1 THE SENSE OF WATER

### 1.1 The Definition of Water Sense

The textbook of Exercise Physiology <sup>[15]</sup> defines "water sensation" as a new, complex and subjective sensation generated when water is in contact with the skin during swimming, and the buoyancy, resistance, pressure and water temperature act on the human body and receive stimulation through the body surface receptors (touch, temperature sense, position sense, proprioception, etc.) and project to the cerebral cortex. The textbook "Sports Psychology" <sup>[16]</sup> defines the sense of water as: the sense of water is an athlete's specialized perception and a person's fine differentiation of water when swimming, which can detect the change of water resistance in time, so as to adjust the intensity and speed of the stroke. National Institute of Physical Education textbook "Swimming" defines water sense as: athletes' feeling and adaptability to water. The famous American swimming coach Colwin pointed out: "Water sense is the intuitive ability of swimmers to effectively control water." Chen Yunpeng, the former coach of the national swimming team, said: "The sense of water is a practical experience that cannot be seen, touched and felt." Based on his own teaching experience, he summarized the concept of water sense into four aspects: "light, floating, floating and sticky" <sup>[17]</sup>. Among them, "light and drift" is shown as the effect of reducing resistance, "sticky" is shown as the stroke effect (the effectiveness of the stroke and the size of the stroke force), and "float" is shown as the balance ability <sup>[5,18-20]</sup>.

It can be seen that the sense of water is a complex subjective feeling, which is not only related to the water medium in which the human body is located, but also related to the sensitivity of the human nerve conduction pathway, skin and muscle receptors. Whether the sense of water is good directly affects the performance of swimming. Swimmers with a good sense of water are generally active in water, with high body position, long floating time, easy movements, accurate coordination, and a good sense of rhythm, speed and direction <sup>[20]</sup>. For ordinary students who come into contact with swimming for the first time, cultivating a sense of water can help students master swimming skills as soon as possible, shorten the learning time, so as to enhance confidence and courage and improve assessment results.

Based on the explanation of "water sense" in the above research, combined with the reality, and from the perspective of swimming teaching for students in ordinary colleges and universities, we define "water sense" as: the swimmer's perception and utilization ability of water with the change of body posture when swimming in water. In the water environment, students rely on the body (including hands and arms) to feel the changes in external water pressure, and the changes in muscle strength, direction of force and body position in the body, and carry out fine analysis and comprehensive adjustment through the cerebral cortex, so as to correctly adjust and control their own movements, correct direction, speed and body position.

### 1.2 The Components of Water Sense

#### 1.2.1 Floating Balance

The sense of buoyancy balance in water refers to the use of buoyancy to maintain dynamic balance when the body position changes during swimming <sup>[2]</sup>. A swimmer with a good sense of buoyancy balance can make full use of and use buoyancy, and the balance of the body is destroyed less restored quickly when swimming. On the contrary, people with poor buoyancy balance spend more time and energy to maintain the dynamic balance of the body, so swimming is not only difficult, but also the body feels heavy <sup>[21]</sup>. When moving in water, different gestures will destroy the buoyancy balance of the human body, and only by constantly adjusting the action can the balance be maintained. Due to the buoyancy of the water, the swimmer's body will always be in a state of weightlessness. Unlike on land, the swimmer's body is much more difficult to maintain balance in the water than on land because the influence of gravity on the swimming process is greatly reduced. Therefore, in the process of swimming,

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swimmers must first have a good sense of balance in order to maintain a good balance in the water <sup>[17]</sup>.

### 1.2.2 Muscle Strength

Muscle strength refers to the swimmer's feeling of the water force when moving in the water, including the size, direction and cross-sectional area of the muscle force acting on the water. It affects the direction of the swim, the speed and the fluctuation of the center of gravity <sup>[21]</sup>. Only the coordination of both limbs can ensure the balance and labor saving of the individual body in the procedure of swimming <sup>[22]</sup>, and achieve the purpose of improving the strength, height and speed of the movement.

### 1.2.3 Sense of Speed

Speed sense refers to the swimmer's intuitive feeling of the water environment in swimming activities, which is the swimmer's judgment and perception ability of swimming speed, and the sum of individual cognition and feeling of the item <sup>[23]</sup>. In the swimming process, the swimmer combines the audio-visual and balance sense and their own induction to produce a sense of speed in the swimming process, and is adjusted according to the actual situation. After systematic training, swimmers often have a keen sense of speed, through the sense of speed, they can use power correctly and cleverly distribute power <sup>[24]</sup>. Therefore, the sense of speed is also called the sense of time <sup>[2]</sup>. Only by combining visual, auditory, sensory and multiple analyses can the precise grasp and timely adjustment of swimming speed be formed after swimming practice. In the early stage of the formation of the sense of speed, students mainly adjust the speed in time by combining the visual and auditory sensations and the corresponding analysis of their position changes in the swimming process and their effective grasp of the speed of swimming [B]. In the process of swimming, swimmers gradually deepen and improve their perception of speed through further swimming practice, and they can make timely and accurate judgments without relying too much on intuitive listening and hearing. Therefore, in order to build a swimmer's sense of speed, we must first form an objective understanding of our own speed through reasonable audio-visual cognition. Secondly, through targeted exercises, sublimate the perception of speed, so as to improve swimming performance <sup>[24]</sup>.

### 1.2.4 Proprioception

Proprioception is an important feeling that enables the exerciser to correctly feel the position and posture of the body in space and the movement of several slices of the human body during movement, including the degree of muscle stretch and joint flexion and extension. Liao Pinsong believes that the proprioceptive afferent impulse of muscles acts in the procedure of establishing the reflex of movement conditions. Without this impulse, the conditioned stimulus will not be strengthened, and the conditioned reflex of movement will not be formed. For a novice swimmer, the swimming skill to be learned will not be mastered <sup>[17]</sup>. Therefore, proprioception should be regarded as an important part of water sense training. Swimming is a periodic exercise. On the surface, swimmers are repeating the action of the previous cycle, but each stroke and each kick have strict action specifications and technical requirements. In order to swim accurately and harmonically, the best way to practice is to experience the changes in the water environment through your proprioception, especially the touch between your hands and the water. Because the training of proprioception not only helps to increase the power of the beginner's body in the process of swimming, but also allows the beginner to better control the position of the body in the water. In the process of cultivating the sense of water, students can be asked to alternate exercises with one hand holding a fist and the other hand not holding a fist in the process of palm stroke during the test of treading water, and both hands holding a fist at the same time, so that practitioners can experience the stroke effect of different hand shapes, and thus cultivate students' perception ability and the ability to obtain power by hand movements.

### 1.2.5 Orientation in water

Swimming is a straight-line sport (except for starting and turning techniques). The swimmer's body position during swimming must be consistent with the direction of swimming. If their bodies are offset during swimming, the streamlined posture will be destroyed, the resistance will be increased, and the swimming distance will be lengthened due to the "S" type of swimming route. Some swimmers can swim basically in a straight line along the center of the waterway even though their visual and auditory senses are obscured. <sup>[17]</sup> Other swimmers not only drift off the center of the channel during the swim, but even touch the water line and cannot swim, and this phenomenon is caused by differences in the ability to Orient in the water. Therefore, the ability of water orientation is also an important part of water sense cultivation. The sense of orientation is also related to technical movements. When the Angle between the front arm and the swimming direction is too large, it is easy to deviate from the swimming route, resulting in increased resistance of water to the body.

The ability of water orientation can be cultivated and improved by a variety of stroke exercises, such as: inward and outward stroke, vertical rotation, upward floating stroke, "8" stroke, etc <sup>[25]</sup>. By adjusting the position of the body and the direction of the curve stroke, the practitioner can learn how to use the pressure of the water and the position of the fingers, wrists, and forearms to get the best results. These exercises are the basis for developing

effective stroke technique. The Angle, position and stroke speed of the opponent in the water have high requirements in the practice of various strokes<sup>[2]</sup>. By perceiving the resistance and pressure of the water opponent, the movement trajectory of the hand can be rapidly coordinated and changed to generate positive pushing force on the body, so that the application of swimming techniques can be accurate, reasonable and coordinated.

## 2 RESEARCH OBJECT AND METHODS

### 3.1 Research Object

The water sense training of 20 swimming beginners (aged 18-22 years old) in Nanjing Institute of Physical Education was studied.

### 3.2 Research Methods

#### 3.2.1 Literature Review Method

In order to accurately understand and timely grasp the cutting-edge academic trends related to the evaluation of swimming "water sense", we consulted CNKI China Journal full-text database and collected relevant materials from National Library and Jiangsu Provincial Library. Meanwhile, according to the needs of research purposes and contents, we consulted several monographs such as Sports Training Science and Swimming Sport. We have obtained the latest research literature in the above research directions, fully understood the research frontiers involved in this research, and analyzed and sorted out the issues related to this research in the literature, so as to obtain more systematic basic theoretical knowledge and provide a substantial theoretical basis for this research.

#### 3.2.2 Experimentation

##### 3.2.2.1 Experimental Subject

Twenty students of Nanjing Institute of Physical Education were arbitrarily separated into experimental group and control group. 10 students (5 males and 5 females) in the experimental group received water sense training, while 10 students (5 males and 5 females) in the control group received conventional swimming teaching without water sense training. Conventional swimming teaching generally includes: familiar with water, edge sliding, technical action teaching, movement proficiency and progression, etc. [6].

##### 3.2.2.2 Test Index

The sense of water is a difficult to quantify index, which is mostly obtained through subjective observation. However, since each observer has different understanding and feeling of all kinds of water sense, it is often subjective, so it is of practical significance to establish an objective evaluation index of water sense.

In the study of Bao Xin<sup>[26]</sup>, three traditional evaluation indexes of water perception were adopted, and each index was divided into four grades: excellent, good, medium and poor. But it also shows that the sliding distance of push off may have a certain relationship with the explosive power of lower limbs. Some researchers have adopted three test methods, sliding on the edge, prone floating body (jellyfish float) and time sensation, as the test contents of swimmers' water sense, and provided corresponding test standards. The indicators used in the test before and after the water sense training cycle were used as the comparison of the effects before and after the water sense training cycle<sup>[6]</sup>. Some scholars have adopted methods such as upright rotation in water and rocking trough stroke with the head in front to cultivate the sense of water<sup>[27]</sup>.

Therefore, based on systematic collation and analysis of existing literatures, combined with my years of swimming practice teaching experience and consultation with relevant experts, this study takes oar paddler (with float), static overhead float, upright gyroscope rotation (with float) and torpedo stroke as the indicators for water sense training of the experimental group (Table 1). Treading water, jellyfish floating, 25m floating paddle and pushing off distance were used as the indexes of water sensation test between them. The test content and requirements of both groups were the same. After 12 weeks of training, the difference between the two training methods was visually assessed.

##### 3.2.2.3 Training Scheme

In the first class, the experimental group should be familiar with the basic teaching of water, and then practice the formal content after ensuring that everyone has mastered it. Training is divided into preparation part, basic part and end part. The basic part includes sculling exercises, static floating exercises, underwater gyro exercises, torpedo strokes, each part of four sets, each set lasts 1 minute, rest between groups 1-2 minutes, the basic part of a total of 50 minutes. Among them, each group of torpedo stroke exercises has a training distance of 25 meters (Table 1). The final section consists of deep deep breathing in the water and relaxing stretching on land for a total of 5 minutes. In the early stage of the experiment, students who cannot complete the exercises according to the requirements can be adjusted by reducing the number of groups or increasing the rest time, while in the middle

and later stages of the experiment, the number of exercise groups and the completion time of movements will be appropriately increased. The control group was given routine swimming teaching by swimming teachers for 12 weeks, with each lesson lasting 60 minutes.

### 3.2.2.4 Experimental Control

**Table 1 Training Methods of Water Sense**

Denomination of Action	Methods of Practice	Number of Exercises
sculling exercises (with float)	With the body upright in the water, draw a flat "8" with the palm of your hand, and use the support formed by the oar to support your head out of the water.	1 minute x 4 sets
static floating	Float your body on your back, with your arms spread out, and adjust your posture and breathing to stay in the water for as long as possible.	2 minutes x 4 sets
underwater gyro (with float)	Perpendicular to the water, cross your feet, one arm in front of the body to the side of the stroke, the other arm in the back of the body to the side of the stroke, so that the body like a gyro rotation.	1 minute x 4 sets
torpedo strokes	Float your body on your back, with your arms in front of your head and your hands in a circle, moving your body toward your feet.	25 meters x4 sets

In order to ensure the consistency of the two groups of irrelevant variables (the site of the teaching experiment, the teacher, the number of lectures, and the length of lectures) in the experiment process, the teaching hours, site facilities, and test indicators of the two groups are the same, and the test time should also be consistent. An underwater exercise watch was used to monitor the heart rate in case the subject overexercised. At the same time, the two groups adopted the training method of divided periods in the experiment process, and were taught by the same teacher. After the experiment, the indicators are tested by teachers who do not participate in the experiment process to ensure the genuineness and correctness of the investigational statistics.

### 3.2.3 Mathematical Statistics

SPSS 25.0 software and EXCEL software were used to analyze the relevant data of the assessment consequences of the two groups after the research. SPSS 25.0 software was used to analyze the alteration between the experimental group and the control group before and after the experiment, and the results were articulated as mean  $\pm$  standard deviation ( $\pm$ SD) and  $P < 0.05$  was considered a significant difference. Finally, the relevant conclusions are drawn through the data, so as to ensure the effectiveness, objectivity and scientific nature of the experiment.

## 4. RESEARCH RESULTS AND ANALYSIS

### 4.1. The Experimental Group and the Control Group were Compared After the Experiment

After 12 weeks of water sense strengthening training in the experimental group, the two groups were tested on four items, and the test results are detailed in Table 2. The experimental results showed that the score of the experimental group was  $42.05 \pm 3.75$ , and the score of the control group was  $38.45 \pm 3.38$ ,  $P = 0.036$  ( $P < 0.05$ ), demonstrating that there was a important difference between the two groups in the evaluation of the treading water project. In the jellyfish drift project, the score of the experimental group was  $43.06 \pm 2.64$ , and that of the control group was  $40.29 \pm 1.78$ ,  $P = 0.013$  ( $P < 0.05$ ), indicating that there was a significant difference between the experimental group and the control group in the evaluation of treading water project. In the 25m backstroke event,

the score of the experimental group was  $41.57 \pm 3.36$ , and that of the control group was  $46.73 \pm 4.71$ ,  $P=0.012$  ( $P<0.05$ ), indicating that there was a significant difference between the experimental group and the control group in the evaluation of treading water event. In the sliding event, the score of the experimental group was  $8.87 \pm 0.93$ , and that of the control group was  $7.94 \pm 0.71$ ,  $P=0.021$  ( $P<0.05$ ), indicating that there was a significant difference between the experimental group and the control group in the evaluation of treading water.

After testing the four items between the experimental group and the control group, it was found that after 12 weeks of teaching experiment, the average score of the experimental group was better or better than the average score of the control group in different degrees, and the experimental data had statistical differences ( $P<0.05$ ). This indicates that the effect of water sense training is relatively significant, and the teaching mode interspersed with water sense training in conventional swimming teaching is conducive to improving the ability of swimming beginners to perceive water, and then improving the teaching quality and teaching effect of swimming courses in colleges and universities.

Table 2 Comparison of test scores between experimental group and control group after experiment ( $\bar{X} \pm SD$ )

Test items	Experimental group	Control group	P value
Treading time (seconds)	$42.05 \pm 3.75$	$38.45 \pm 3.38$	0.036*
Jellyfish float time (seconds)	$43.06 \pm 2.64$	$40.29 \pm 1.78$	0.013*
25m backstroke (seconds)	$41.57 \pm 3.36$	$46.73 \pm 4.71$	0.012*
Sliding distance (m)	$8.87 \pm 0.93$	$7.94 \pm 0.71$	0.021*

Note: \*The table indicates significant difference between the two groups, that is,  $p<0.05$ ,

#### 4.2 Contrast of learning interest between the experimental group and the control group before and after the experiment

It can be perceived from Table 3 that after 12 weeks of swimming teaching, both the two groups have improved their overall interest. Among them, the improvement in the experimental group was more obvious. The number of people “actively entering the water” in the control group increased from 4 before the experiment to 7 after the experiment, and the number of people “actively entering the water” in the experimental group increased from 5 before the experiment to 10 after the experiment. It shows that the water sense exercise is more conducive to stimulating and improving the learning interest of swimming beginners in colleges and universities than the conventional swimming teaching mode, so as to help students better adapt to the water environment, eliminate the tension and fear of swimming, so as to enhance the initiative and enthusiasm of beginners in swimming, and improve the quality of teaching.

**Table 3 Comparison of overall interest in training between the experimental group and the control group before and after the experiment**

<b>Content</b>	<b>Experimental group before training (number of people)</b>	<b>Experimental group after training (Number of persons)</b>	<b>Control group after training (Number of persons)</b>	<b>Control group after training (Number of persons)</b>
Active entry into water	5	10	4	7
Passive entry into water	5	0	6	3

## 5. ANALYSIS AND DISCUSSION

### 5.1 The physiological mechanism of water sensation

When a person is swimming, the whole body is in the water environment, and the buoyancy, pressure, resistance and water temperature of the water act on the human body. When completing the action, the muscle is pulled and actively contracted or relaxed, which will stimulate the muscle spindle or tendon spindle feeling device to generate excitement. At the same time, all kinds of skin receptors, such as pressure receptors, touch receptors, temperature receptors also constantly accept the stimulation of water and generate excitement. These receptors transmit excitatory impulses along the human nerve, through the lower centers (spinal cord, thalamus) to the motor area and motor sensory area of the cerebral cortex. Through the analysis and synthesis of the cortical centers, a compound feeling of water is produced. That is “water sense”. [28]

When swimmers swim, muscle activity and water pressure will cause skin deformation, and proprioceptors and tactile receptors are also stimulated. With the help of proprioceptors and skin receptors, swimmers complete their movements through the coordination and coordination of the functional activities of the subcortical motor centers and the relevant centers of the cerebral cortex. A slight dissonance in this relationship leads to inaccurate movements. At this time, the central nervous system accepts incoming impulses from receptors, corrects and restructures in the high-level motor center of the cerebral cortex, and adjusts muscle strength, movement speed and body posture in time. In this way, the continuous feedback connection promotes the formation of motor skills, which are increasingly improved by enriching practice, so that the movement coordination is accurate. Therefore, the movement sensation, the feeling of each part of the body, and the spatial position of the whole body generated by any action in the swimming process are all compound sensations, which are realized by the excitation of the cerebral cortex integrating touch, position sense, temperature sense and proprioception. In the water, the role of the swimmer’s visual and auditory sensory organs is limited, so the swimmer can only rely on the touch to feel the change of external water pressure, mainly rely on the proprioception to feel the stroke strength of the hand and arm, and adjust and control the strength and direction of the arm through the cortical motor center to master the correct movement and maintain the correct swimming direction and speed.

After summarizing the views of predecessors, it is believed that “water sense” is trainable and can be acquired

through acquired practice, which is closely related to the degree of stickiness and perceptual acuity of the body. In addition, the swimmer's subjective sense of water (such as sense of balance, sense of speed, sense of resistance sensitivity, proprioception and direction of force, etc.) can be acquired and cultivated in the acquired practice [2], and the gradation of improvement is completely associated through the practice level [6]. It should be noted that the generation of water sense is not fixed. The water temperature of the swimming pool, the swimming speed, the physical condition of the swimmer and the emotional quality and other factors will change the water sense. If they stop training, the sense of water they have acquired may decrease or even disappear, so we should pay special attention to the consistency of water training [28]. Therefore, in the process of carrying out swimming teaching, college teachers should not only repeatedly remind students of the importance of "water sense cultivation", but also adopt effective exercises to cultivate water sense in practice. Practitioners should adhere to experience, deepen the sensory traces, make the internal and external receptors get sensory stimulation, establish nerve connections in the nerve center, and finally form a dynamic stereotype. In this way, it is better to combine the practice of technical movements with the cultivation of water sense.

## **5.2 Discussion on the methods of training students' water sense in swimming teaching in colleges and universities**

In conventional swimming teaching, when teaching a certain technical movement, the teaching steps are usually explanation-demonstration-practice. However, teaching practice shows that only students with water sense can have a deeper understanding of the principle of technical movements, and then can master the movements better and faster [6]. Therefore, the practice of water sense can be interspersed in the regular swimming teaching. For example: various strokes in different forms and directions (backstroke, upright rotation, and sculler, etc.). By adjusting the body position and stroke direction, the trainer can understand how to use the water pressure and the position of the fingers, wrist, and forearm to get the best power effect. When the scholar's body changes in horizontal position or the body is affected by factors such as the buoyancy of water and the center of gravity, sensory systems such as vision and hearing will also be limited by the water environment. At this time, the best way is to rely on their own proprioception to feel the changes in the water environment, especially the sense of touch between hands and water [29]. The students' perception of the current can be improved by simultaneously making fists with both hands during the stroke, and by alternating the practice of making fists with and without one hand. It is worth mentioning that students with "fear of water" need to focus on. In many years of swimming practice teaching, it is not difficult to find that some beginners have not completely eliminated their fear of water, and they have already learned technical movements, which can be reduced to the minimum through some psychological training and hints. By carrying out simple "water games" and breathing imitation exercises on land, students can get a good psychological experience. Only when beginners have a familiar and relaxed understanding of the water environment, can they learn swimming skills without burden and move more smoothly and naturally.

## **6 CONCLUSIONS**

### **6.1 Conclusion**

6.1.1 After 12 weeks of water sense exercise, the experimental group had better performance in various tests (Treading time, jellyfish floating time, 25m floating stroke, push-off distance) than the control group ( $P < 0.05$ ). It shows that the effect of water sense training is relatively significant, and the teaching mode interspersed with water sense training in conventional swimming teaching is conducive to improving the ability of swimming beginners to perceive water, so as to improve the coaching quality and training effect of swimming progressions in colleges and universities.



6.1.2 After 12 weeks of swimming teaching experiment, the overall interest of students in both the tentative group and the controller group has been improved to a certain extent, but the improvement of the experimental group is more obvious. It shows that the water sense exercise can more effectively promote the learning interest of swimming beginners to a certain extent, so as to improve the initiative and enthusiasm of swimming.

6.1.3 In the process of swimming lessons, the reasonable use of water sense exercise can enrich the training means and expand the efficiency and eminence of teaching. It can allow students to master some of the most basic movements, and lay a good foundation for the later learning of swimming technology.

## 6.2 Suggestions

6.2.1 In the teaching process, teachers should cultivate water sense throughout the whole swimming teaching process, and appropriately increase the practice of treading water, paddlers, side strokes and other techniques, so that students can experience the pressure from different directions, different movements and different forms in the water, in an attempt to attain the determination of enlightening the water sense. Therefore, it is suggested to promote the water sense teaching method in general swimming courses in colleges and universities.

6.2.2 The content of water sense training can be selected according to the buoyancy balance sense in the water, the ability of orientation in the water, the proprioception and other indicators, such as the lifting stroke exercise, the clenching exercise, the gyro exercise in the water, the jellyfish drift exercise, and the water walking exercise.

6.2.3 Through carrying out swimming teaching experiments, the water sense exercise has achieved good results, but in the training procedure of swimming sequences in universities, it should be constantly improved. At the same time, it organically combines with the conventional swimming teaching mode, complements each other's advantages, and then improves the teaching quality and forms a diversified development teaching mode.

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#### ABOUT THE AUTHOR

Rongting Zhao

College of Physical and Health Education, Guangxi Normal University, Guilin 541006, Guangxi, China

E-mail: rtzhao1996@163.com

Jiwei Yao

College of Physical and Health Education, Guangxi Normal University, Guilin 541006, Guangxi, China

E-mail: 15150550801@163.com