Research on the Application of CAI in College Swimming Teaching

Xiumei Ma

Basic Teaching Department, Shanghai Urban Construction Vocational College, Shanghai, China

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Abstract: Swimming is one of the most difficult and backward items in college physical education. In view of many obstacles in traditional swimming teaching, this paper innovatively applies CAI Digital Technology in swimming teaching in order to effectively and quickly change the current situation. The key methods are to carry out the club teaching mode, strengthen the swimming demonstration method and increase the swimming theory class hours, and make technical guarantee and comprehensive support for these three aspects with CAI Digital Technology. Five years of practice in our school has proved that C digital technology has played a unique and significant role in improving students' understanding and improvement of swimming technology. Most students learn to swim and love swimming in 12 class hours.

1. Introduction

Swimming is the main fitness project advocated and promoted in the national fitness program, which has a strong effect on promoting body health and developing body-building. American futurists have predicted that swimming is the most popular sport in the 21st century. Today, when lifelong sports are advocated, learning to swim will benefit you all your life. However, in the current situation of physical education in Colleges and universities, swimming is the most backward, the most difficult, and the most pessimistic item.

The backwardness of swimming teaching in China's colleges and universities lies in the backwardness of teaching methods. Compared with land sports, swimming has many characteristics and difficulties: practice in unfamiliar water environment with unaccustomed horizontal posture; vision and hearing are limited; the formation of skills depends more on the body feeling. There are many obstacles in swimming teaching with traditional teaching methods.

Swimming teaching reform can start with increasing the proportion of swimming theory course, strengthening the means of swimming demonstration method and adopting club teaching mode. In order to achieve remarkable results in these three aspects of teaching reform, we must have a new teaching technology as a comprehensive support. Cai Digital Technology can provide technical support for these three aspects and play a unique and significant role.

At present, it is not uncommon to use multimedia as teaching aid in college physical education, but it is rare to use Cai Digital Technology on a large scale in a single physical education. The reform and research of swimming teaching and the exploration of applying CAI digital technology in our school started five years ago have achieved phased success. The students learn to swim in a large area, and the top players emerge in endlessly. They have won the swimming competitions in Shanghai universities, and swimming has become the characteristic sports campus culture of our school.

2. The current situation and difficulties of swimming teaching in colleges and universities

It is an excellent combination of swimming, air, water and body exercise. However, in China, even in colleges and universities where young people are most concentrated, the number of people who can swim is surprisingly low. According to incomplete statistics, about 70% of the students in colleges and universities south of the Yangtze River can't swim, and 84% of the female students can't swim; the proportion in the north of the Yangtze River is even higher. According to the questionnaire survey conducted by many colleges and universities, college students highly value

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swimming, and most of them love and want to learn how to swim. This extremely contradictory reality reflects the backwardness of swimming teaching [1].

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The backwardness of swimming teaching in colleges and universities is also reflected in the maladjustment of teaching mode. The more prominent phenomenon of swimming teaching than other special subjects is the large individual differences of students in the water environment, which causes teachers to take care of one thing and lose the other in teaching and can not meet the learning requirements of students at different levels at the same time. There is also a more special problem, that is, the problem of teachers: about half of college physical education teachers can't swim by themselves. Due to the multi-level student groups and the obvious shortage of teachers, the swimming class under the current class division system can only become a laissez faire entertainment class [2].

3. The reform of swimming teaching

Swimming in the water environment has the characteristics and difficulties that most land sports do not have, so we must innovate the special methods suitable for the characteristics of swimming teaching. Our experience is: teaching methods are not good or bad, but each has its own limitations. The reform of swimming teaching is to boldly abandon the methods that are effective for most of the projects, but poor for swimming teaching, and choose and innovate the methods that are effective for swimming teaching. After experiment and practice, we determined the main reform contents as follows:

3.1 Increase the proportion of swimming theory course

The object of swimming teaching in colleges and universities is the students with high intelligence advantage. Therefore, increasing the proportion of theory course in swimming teaching in colleges and universities, giving full play to the strength of students' theoretical thinking, knowing it and guiding swimming practice with theory can achieve twice the result with half the effort.

3.2 The means of strengthening the swimming model law

The organic combination of demonstration and explanation is an important guarantee to improve the quality of teaching, but according to the characteristics of swimming teaching, we should weaken the explanation method and strengthen the demonstration method. There are two reasons for weakening the explanation method: first, the noisy environment in the swimming pool makes it difficult for students to hear the teacher's explanation clearly; second, the water training time is precious, so the explanation must be as brief as possible. It is particularly important that demonstration is helpful for students to have an insight into the essence of movements and master them quickly and reliably.

3.3 Adopting club teaching mode

The differences in the starting level and ability of learning swimming among college students are far greater than those in other sports and cultural knowledge. Therefore, according to each student's innate quality and the ability of practical activities in the water, we should scientifically divide the students into teaching levels. This kind of hierarchical teaching is helpful for teachers to organize teaching, to feedback information between teachers and students, and to fully mobilize students' learning enthusiasm and initiative. From our practice, the scientific implementation of differential teaching and hierarchical teaching can greatly improve the teaching quality of swimming, so we must abandon the class system and adopt the club teaching mode [3].

4. The technical support of swimming teaching reform is Cai Digital Technology

Swimming is generally recognized as the most significant difference between the learning ability of college students and the teaching ability of teachers. In order to achieve remarkable results in these three aspects of teaching reform, we must have a new teaching technology as a comprehensive support. After analysis and comparison, it is believed that multimedia digital technology can provide technical support for these three aspects of reform and play a unique and significant role [4].

First, multimedia technology can transfer knowledge and information to students in the form of text, graphics, images, sound, animation, video and other comprehensive forms. It not only has a large amount of information, but also can change static into dynamic, complex into simple, difficult into easy. It can show the students the knowledge that is difficult to master and understand, such as fluid mechanics, at a glance, and make the complicated and arduous cognitive activities simple and relaxed. Pictures, images, animations and other visual information are very helpful to help clarify the key points and difficulties of swimming fluid mechanics and vividly inspire students' thinking and imagination, which is also incomparable with any other technology at present.

Second, because of the special environment of water, vision and hearing are limited. Especially for beginners, they can only use the imitation of land actions to establish the concept and representation of actions. Underwater photography and digital processing technology can enable students to see the real action of swimming from multiple directions in the water, with pictures, text and sound in one, and at the same time affect students' multiple senses, making the swimming teaching demonstration content visualized, vivid and expanded. The more sensory organs are used in the teaching process, the more fully the learning function is played, and the easier the swimming skills are understood and mastered. Using CAI, the teacher can combine the picture demonstration and explanation, repeat many times without error, and the students can analyze and correct the mistakes by themselves. CAI can not only greatly improve the correctness of swimming demonstration action, greatly strengthen the effect of swimming demonstration teaching, but also greatly save valuable time for demonstration and explanation in the swimming pool, so that students can practice more and practice more in the limited swimming pool time, and speed up the teaching progress.

Thirdly, multi-media technology can adapt to the teaching objects with large gap to the greatest extent. Multimedia technology uses its powerful graphic interaction and window interaction to control the display of multimedia information, which is extremely beneficial to the hierarchical teaching of clubs. Swimming clubs set up elementary, intermediate and advanced courses to meet the different starting points and needs of all students. In principle, students have the right to choose courses and time independently, so as to match their needs to the greatest extent. This kind of adjustment can make students get the most effective learning in the shortest time. Multimedia technology can meet the needs of junior, middle and advanced swimming courses at the same time. For the same object, it can switch from the course to the specific content or even a picture in a large span. It is not only beneficial to students' learning, but also beneficial to teachers' teaching.

5. Application of CAI in swimming teaching reform

5.1 Application of CAI in swimming theory course

In the past, blackboard and chalk were used as the main teaching methods in the teaching of swimming theory, supplemented by a large number of wall charts. Students had to convert these plans into three-dimensional images in their minds. CAI teaching can combine text, image, sound and other information to improve the efficiency of classroom teaching. In some knowledge points that need to be emphasized, you can play them repeatedly or enlarge the relevant images, so that students can better understand the teaching content and master the key points and difficulties.

For example: hydrodynamics regards water and air as fluid, but the resistance of water is 800 times that of air. When human body swims in water, the resistance is proportional to the square of

velocity. Therefore, swimming theory holds that to improve the swimming speed, we must effectively reduce the resistance. The experimental data show that the Junior Swimmers with the same body shape and propulsion can also swim the 25m freestyle. If one of them reduces the resistance by 10%, he can shorten the time by 5 seconds and lead the opponent by 3 meters!

We use SGI Altix for the above passage of fluid mechanics the students can see the water flow around the body, not around the head, but around the body it's stagnant. The digital image uses red (warm) color to blue (cold) color to show the degree of stickiness. Students can see all the contours of friction along the body surface and areas with high skin friction resistance.

From the perspective of hydrodynamics, the improvement of swimming speed depends on the increase of propulsion resistance and propulsion lift. Or the best combination of the two. The digital image allows students to see how the swimmer's limbs move, so that the shape resistance coefficient and water retaining area increase, the effective stroke route increases, the force action time is more sufficient, and the direction of the total resultant force is consistent with the swimming direction as far as possible.

Swimming theory course uses digital image as dynamic media resources, with its rich dynamic effects and accompanying sound effects, it plays a unique role in creating situations, stimulating emotions and solving the teaching problems of swimming theory course, which can not be achieved by other teaching methods. It has become the most popular and "the most interesting and vivid" sports theory course for students.

5.2 The application of CAI in the enhanced model law

In swimming teaching, the following three aspects should be emphasized:

First of all, it is necessary to fully cooperate with the action demonstration, so that students can clearly watch the demonstration action from all directions (side, front and back). The second is the demonstration of local action, the decomposition of demonstration action and stage action, including the demonstration of freeze frame action. The third is slow demonstration. In swimming teaching, some students always show learning difficulties in some important and difficult technical links. At this time, the demonstration should try not to destroy the continuity of the action, or decompose the demonstration without destroying the structure of the action. Students can achieve good teaching effect by synchronous practice under the slow and difficult demonstration.

The above three aspects are difficult to achieve in practical teaching. Swimming is a course with the biggest difference in Teachers' teaching ability. About half of college physical education teachers can't swim, so it's more difficult to make standard demonstration actions. Some technical movements with complex structure and strong technicality, which must be completed in high-speed movement, are the key and difficult points for students to learn swimming, but the teacher's demonstration can not be completed on land or stopped in water. Affected by waves and water spray, students watching the demonstration was also greatly affected.

With the adoption of CAI, this teaching problem can be easily solved. The computer can digitize the video data of the standard swimming skills, and then demonstrate the complete and partial movements to the students repeatedly. In the process of demonstration, teachers and students can slow down (adjust the speed independently), fast play, normal, capture a picture, or capture a part for demonstration and observation according to the learning needs, until the students are completely familiar with and master it.

our digital image database can directly invite Phelps of the United States, Thorpe of Australia, Sun Yang, Fu Yuanhui, Zhang Lin and Wu Peng of China to make various top-level standard demonstration moves. Students can directly learn demonstration moves from the best swimmers in the world, which can greatly shorten the teaching time, imitate and copy the standard technical moves without causing any harm the amplification of fallacy. In addition, the clear and beautiful images, vigorous athletes and exciting sound effects directly stimulate students' senses, greatly enhance their interest and accelerate their learning process.

In order to more accurately judge the quality of students' action completion, and scientifically and effectively guide the school swimming team training, we learn from the motion graphics and

image measurement and analysis system developed by the Institute of computing technology, Chinese Academy of Sciences, and try to use video analysis software to conduct synchronous comparative analysis of students' kicking and rowing movements. First of all, we use the camera installed in four angles to capture the technical movements of kicking and rowing from different directions. After inputting these images into the computer, we use the video analysis software to analyze and process them. Then we use the computer to calculate the time spent in each stage and the strength of each part of the body in each movement cycle, and establish a three-dimensional swimming mechanics model on the computer and reference coordinates. This system can also capture the kicking or rowing movements of the students, store the data into the computer, draw the movement track of each joint point, mainly the shoulder, elbow, hip, knee, ankle and other important joint points through the analysis software, analyze the students' technical movements and compare with the standard movements. If the curve is basically the same, it shows that the action is completed well, and the students can give feedback on the quality level of their own completion at the same time of the test. In addition, the teacher also judges the technical problems in the training of school swimmers by calculating the movement parameters, such as trunk angle, elbow angle, knee angle and so on [5].

5.3 Application of CAI in club mode

Swimming is a course with the biggest difference in the level of college students. Taking the students who can't swim at all as an example, they can be divided into three levels: the first level is the students who are not afraid of water, have high understanding, and master the action quickly; the second level is the students who are not afraid of water, but master the action slowly, have poor physical coordination ability, and have stiff action; the third level is the students who are afraid of water, have mental tension, and dare not do any action in the water. The three types of students must study at different levels in order to achieve the greatest harmony between subjective efforts and objective conditions.

Swimming is also one of the courses with the biggest difference in teaching ability of college physical education teachers. Only club mode can make teachers with different teaching ability teach by category. Teaching students in accordance with their aptitude and giving full play to their teaching ability to teachers.

The swimming club of our school has advanced, intermediate and elementary swimming courses, and each level is subdivided into 3-4 categories. Therefore, the teaching of the whole swimming club is complicated, and it is totally incompetent to rely on the existing teachers and teaching resources.

We can meet the different learning needs of different levels of swimming clubs at the same time and in the same place with the CAI courseware. For example, student a is a freshman who can't swim at all. He enters the swimming preparation classroom with exercise magnetic card at PM 4:27, and answers a series of questionnaires on the computer to conduct a graded self-test. The test suggests that a should take the primary class 2 as the starting point. The first lesson is "self rescue of accidental falling into the water": text, animation and video instructions written with PPT, flash and digital technology: for students who can't swim, we give up the conventional learning contents such as holding knees and floating body, pedaling and sliding, and first learn the self rescue of accidental falling into the water. In this way, people will not be afraid of water because of sudden change of body posture, so as to cultivate their self-help ability when they fall into the water. The specific contents are:

Body glides into the water; floats from back to stand; symmetrical wheel paddles lift the head out of the water; body upright water exercises symmetrical wheel paddles, lift the head out of the water immediately with mouth breathing; self rescue swimming posture (i.e. body upright, hands in front of the body or body side pressure water, also can float, do symmetrical wheel paddles on both sides of the waist) exercises.

In this lesson, we pay special attention to the technique of symmetrical rotation of both hands. It is emphasized that this technique plays a very important role in self-help, self balance in water,

cultivation of water sense and subsequent enhancement of lift and driving force in competitive swimming. Therefore, a large number of video technology demonstration. After making full observation and imitation practice in the preparation classroom, little a went into the swimming pool to learn.

For example, the student big q is already a student of advanced three courses, and he is in PM 4: He was asked to test his heart rate immediately after the 4 * 100m freestyle variable speed swimming, pay attention to the skills of arm bending and elbow lifting of Freestyle paddlers, as well as the problem of high head breathing. Big Q also read the relevant image data in the database, and carefully experienced the planned training in the swimming pool. Seventeen.

6. The application of CAI in swimming teachingpplication of CAI in swimming teaching reform

6.1 Application of CAI in swimming theory course

In the past, some multimedia coursewares have been made with PPT technology in physical education class, most of which are attached to a text textbook or script to form a complete text. Once due to the change of time or writing materials, it is very difficult to reorganize, which makes the utilization rate low. Because it is a complete text, it is limited in class use, call and search. In the application of CAI in swimming teaching, we determine that digital technology is mainly used. The digital images recorded, intercepted and produced can meet different teaching needs, and have the material characteristics of module building, combination and interleaving, which can be easily searched, used and regulated from the database [6]. It is necessary to make a large number of basic material units containing swimming teaching information in the preparation stage. For example, the kick and stroke can be divided into many relatively independent units, which can be interspersed and combined in different teaching levels and different teaching methods. Another example is the excellent swimmers' competition materials like Phelps, the location of the water cube, the digital images of the swimming pool facilities, and the teaching and training of the students in the swimming Department of the Institute of physical education. These single content videos are very convenient basic material units for production.

These relatively independent, easy to reorganize, not attached to a text of the basic material unit, due to the flexibility of its use, promote its utilization rate greatly improved, edit different teaching content time is obviously saved, students feel vivid, teaching effect is better.

In the production of these basic material units, considering the short loading time, smooth playback and friendly interaction, the image file should not be too large. Under the premise of little loss of image quality, it is the best policy to choose optimized compression coding. To this end, the original image data must have higher quality requirements and the corresponding processing capacity, we take the video streaming and other streaming media technology. Streaming media does not download the whole file before playing, but only store the beginning part of the content in the memory, cache the data packet in the computer and output the media data correctly. In this way, not only the stability of LAN transmission is ensured, but also the download waiting time is reduced.

6.2 Integrated control and interaction design

Including the course of swimming theory hydrodynamics, the CAI Courseware of swimming teaching must be easy to play and control. The image data can be selectively played according to the needs of teachers or students, and can be replayed, slow played, fast forward, fast backward, pause, and dynamic control of sound effect at will. Only in this way can the powerful teaching effect be brought into full play [7]. Therefore, we adopt the integrated control and interaction design of CAI digital technology. Compared with the traditional way, the integrated control not only has good image expression, but also has strong random control ability. Interaction design is mainly aimed at the relatively independent and scattered structure of a large number of basic material units. Unreasonable design will lead to complex structure and difficult to find. The navigation design first lists the main clues from the structure as the top-level structure of the main interface of interaction,

and then establishes the next level directory in the following layers, but the two to three layers are better, so as to make the interaction of courseware more friendly. Too many layers will lead to structural confusion. There are many levels of swimming clubs in our school, and there are many swimming teaching contents, which leads to a large number of secondary directories. We set up the navigation bar in a unified style. The same level of directory uses buttons with the same color and graphics, and the contents being displayed are distinguished by button color change. Practice has proved that the navigation bar is very convenient for students and teachers to locate the playing object.

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