A Research on the Application of the "Internet Plus Swimming" Teaching Mode in Universities

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Abstract: This study focuses on the reform and development of physical education in colleges and universities in the post-epidemic era, beginning from the design of an innovative "Internet Plus Swimming" teaching mode to enhance the quality of swimming lessons in colleges and universities, and subsequently applying it to the teaching of technical movements in swimming, so as to promote the teaching reform of swimming lessons in colleges and universities, as well as improve the teaching quality. This study showed that the students in the experimental group were better than those in the control group in four aspects: theoretical knowledge of swimming, speed, technique, and students' independent learning ability. It can be concluded that it is both, effective and feasible to integrate multimedia learning resources, using digital information technology and network mobile devices, to construct the "Internet Plus Swimming" teaching mode and apply it to general swimming courses in colleges and universities in the post-epidemic era.

Keywords: Internet Plus; Swimming; Teaching mode; University

1. Introduction

In the period of epidemic prevention and control, schools at all levels have responded to the call for online teaching activities [1]. The "Internet Plus Education" has achieved a breakthrough in the restrictions of time and space in learning. It has many advantages, including optimizing the allocation of educational resources, promoting educational equity, and enriching the course content [2]. The success of many online courses validates the feasibility of the "Internet Plus Education" mode [3-5]. Therefore, this study focuses on the reform and development of physical education in colleges and universities in the post-epidemic era, beginning from the establishment of an innovative "Internet Plus Swimming" teaching mode to improve the quality of swimming lessons in colleges and universities, and subsequently applying it to the teaching of technical movements in swimming.

2. Research methods
2.1. Research subjects

In order to ensure that the experimental subjects meet the requirements of the study without influencing the outcomes of the study, 120 physical education students with no swimming background and psychological disorders, such as hydrophobia, were selected for the study; they were then equally divided into the

experimental group and the control group, respectively. Independent sample t-tests were conducted on the four swimming-specific physical fitness components (height, weight, arm length, and lung capacity) of the two groups. As shown in **Table 1**, the *p*-values were 0.560, 0.915, 0.718, and 0.565, respectively, all of which indicate that there was no significant difference between the two groups, suggesting that the subjects' swimming-specific physical fitness levels were the same before the experiment.

Table 1. Results of students' physical condition tests before the experiment

	Experimental group (n = 60)	Control group (n = 60)	t-value	*p*-value
Height (cm)	188.842 ± 6.994	187.500 ± 7.244	0.588	0.560
Arm length (cm)	191.421 ± 7.647	191.70 ± 8.442	-0.108	0.915
Weight (kg)	83.053 ± 9.507	82.000 ± 8.553	0.364	0.718
Lung capacity (ml)	5,304.474 ± 746.077	5,451.750 ± 833.002	-0.517	0.565

Through a detailed analysis of the current situation of China's elementary education reform, it can be seen that from the perspective of educational objectives, China has undergone three stages, from consolidating the "double foundation" to establishing the "three-dimensional objective," and then to introducing the idea of "core literacy" [3]. This process fully reflects the successful transformation of China's elementary education reform objectives from "knowledge – discipline knowledge – people" [4]. In the process of establishing the objectives of elementary education, China should constantly adhere to the ideological principle of "people-oriented" education and attach importance to improving students' core literacy and subject literacy. In the process of implementing the "double foundation" objectives, the phenomenon of which a huge gap exists between the theoretical knowledge learned and students' real life tends to be overlooked, which leads to a sole focus on learning theoretical knowledge, while neglecting practical skills [5]. The "three-dimensional objective" is an educational goal with clear benefits at the disciplinary level based on the "double foundation," but the understanding of "human essence" is neglected. The "three-dimensional objective" only superimposes the three-dimensional goal but does not fully integrate the educational goal. The primary approach of "core literacy" in representing educational objectives is by improving students' literacy through knowledge education, which is an educational means that can return the original nature of "human" [6]. In the new era of establishing a high-quality elementary education system, the teaching contents should be linked with actual life situations in the transformation of education methods, and students' personality development should be based on social needs [7].

2.2. Literature search

According to the needs of this study, CNKI, Vipshop, Wanfang data, and foreign language databases, such as PubMed and SPORTDiscus, were used to obtain literatures on "Internet plus," "Teaching Mode," "Physical Education," and "Swimming Teaching." They were then organized and analyzed to provide the theoretical basis for this study and lay the foundation for subsequent research.

2.3. Questionnaire survey

In this study, two questionnaires were designed to investigate the students' theoretical knowledge of swimming and their learning under the "Internet Plus" mode from various perspectives, such as their learning situation, learning effect, and satisfaction after the course, so as to determine the advantages and disadvantages of applying the "Internet Plus Swimming" teaching mode to swimming courses.

2.4. Experimental method

In order to investigate the effectiveness and feasibility of the application of the "Internet Plus Swimming"

teaching mode to swimming lessons in colleges and universities, the experimental method of applying the "Internet Plus Swimming" teaching mode to general swimming lessons was used to compare the effect of the established "Internet Plus Swimming" teaching mode and the traditional swimming teaching mode on students' basic theoretical knowledge of swimming, their learning of technical movements, and the cultivation of skills through experimental intervention.

(1) Selection and testing of experimental indexes

The test indexes were established based on the final examination standards of the general swimming syllabus of college physical education and the suggestions of experts from the teaching and research department. Pre-experimental test: swimming-specific physical fitness (including height, weight, arm length, and lung capacity) and students' learning situation survey. Post-experimental test: swimming skill test (technical movement evaluation and speed performance test), theoretical knowledge assessment, and students' learning situation survey.

(2) Technical movement evaluation index

The scoring standard of breaststroke movement is based on the requirements of the swimming course syllabus of college physical education. It includes the following components: familiarity with water; breaststroke movement; starting technique; turning technique [6,7]. As shown in **Table 2**, the technical movements can be classified into five grades (excellent, good, moderate, fair, and poor), with a total score of 100. Teachers who have expertise in this field will grade the quality of students' movements according to the requirements of each component.

Table 2. Classification of technical movements

Grade	Score	Movement quality
Excellent	90–100 points	Correct and consistent movements, with only a few mistakes
Good	80–89 points	Movements are overall correct, without many mistakes
Moderate	70–79 points	Movements are barely completed, with several mistakes
Fair	60–69 points	Movements are barely completed, with several mistakes and are of low quality
Poor	Below 60 points	Movements cannot be completed, with incorrect key movements and obvious mistakes

(3) Theoretical knowledge assessment

The theoretical knowledge assessment includes the following domains [8]: overview of swimming (classification of swimming, competition items, significance and practical value, as well as development overview); mechanical principles of swimming (buoyancy, resistance, propulsion, and other principles); general principles of swimming (reasonable technique, high and flat body posture, acceleration curve, arm stroke cycle, breathing techniques, swimming rhythm, and frequency) [9].

2.5. Statistical analysis

The experimental data were organized, tabulated, and plotted using Microsoft Office. The data were analyzed and processed with independent sample t-test using SPSS 17.0.

3. Developing the "Internet Plus Swimming" teaching mode: Taking the breaststroke movement as an example

3.1. Pre-course preparation stage

3.1.1. Establishing a breaststroke movement internet learning platform

Establishing an internet learning platform with information on the breaststroke movement is an important aspect of constructing the "Internet Plus Swimming" teaching mode. It includes the selection, collection,
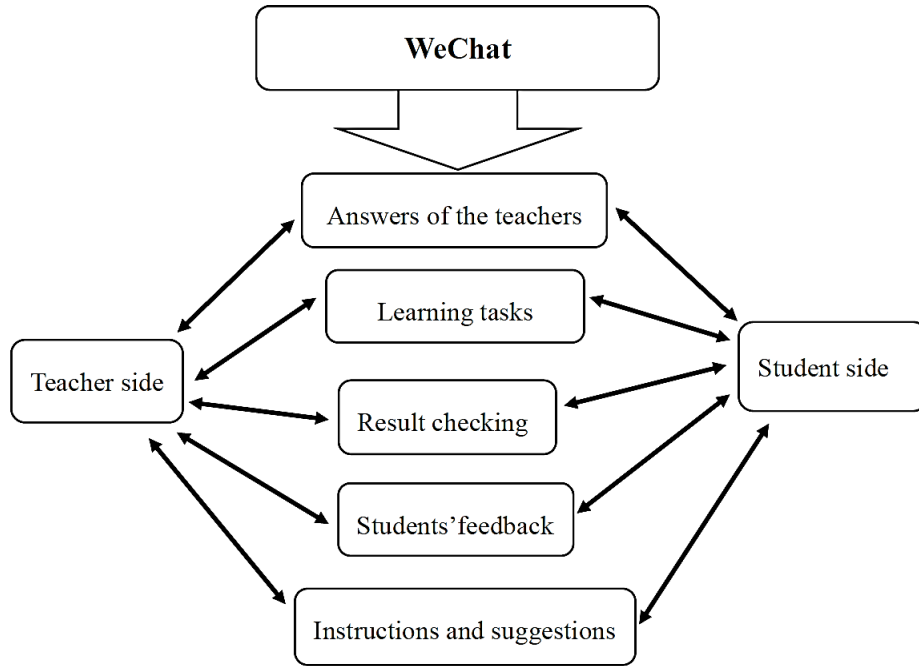
and integration of learning resources pertaining to the breaststroke movement, which put to test the teachers' capability in applying information technology [10]. As shown in **Figure 1**, the process of establishing an internet platform for learning the breaststroke movement can be divided into the following steps: first, collect and organize various learning resources of the movement from the internet (including motion picture GIFs, videos of advanced athletes and renowned teachers, basic theory of the movement, textual points, and other relevant resources); second, upload learning tasks separately based on students' movement skill learning development rules, the degree of importance and difficulty of the movement, as well as the teaching progress; third, envision teaching activities according to the teaching content. The learning resources can be integrated and processed, and an intuitive, simple, and clear breaststroke movement learning page can then be created [11].
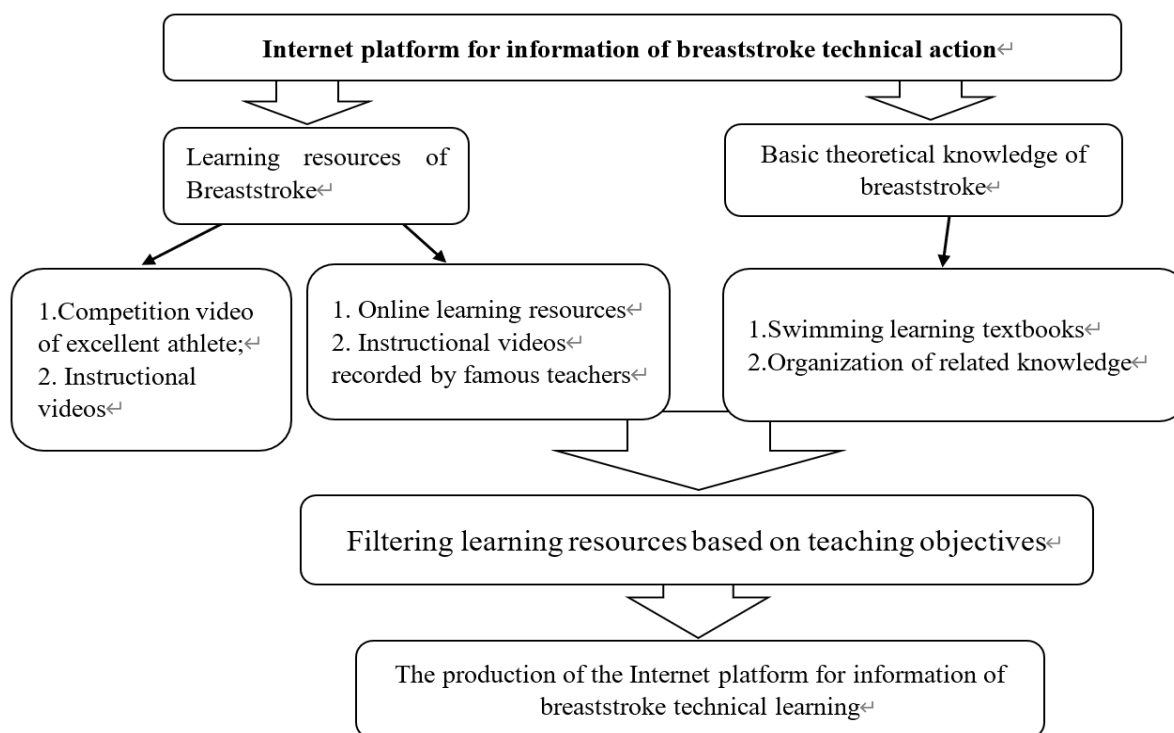
Figure 1. The process of establishing a breaststroke movement internet learning platform

3.1.2. Creating an online communication platform

Creating an online communication platform is also an important step to realizing the integration of the traditional swimming teaching mode and the online teaching mode. As shown in **Figure 2**, the platform is mainly used for online communication between teachers and students, as well as among students themselves; additionally, it can be used to upload learning tasks and learning resources, notifications, and files. This platform assists teachers in better understanding students' situation, including their difficulties and problems, and it also serves as the foundation for in-person class teaching to enhance, adjust, and comprehend the key points.

Figure 2. Online communication platform settings

3.2. Students' self-learning
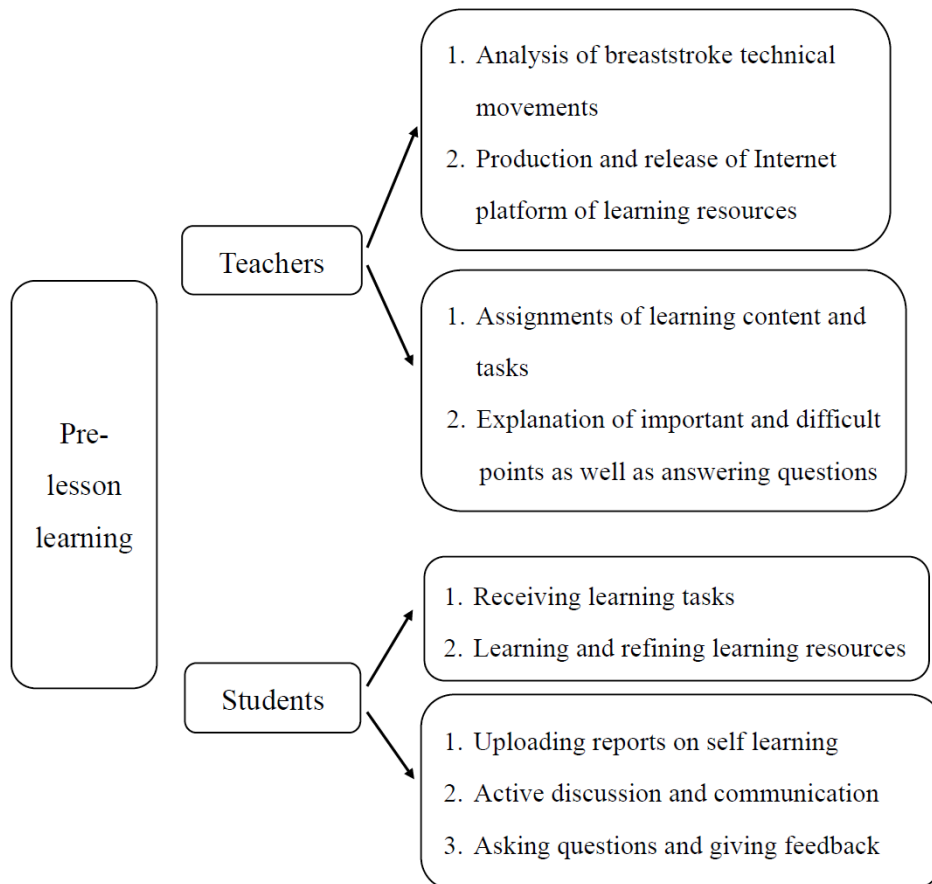
Figure 3. The pre-course learning structure

The students' self-learning stage is when students acquire online learning resources, screen and integrate effective learning information, and then develop their self-construction skills and self-learning ability [12]. As shown in **Figure 3**, before the class, teachers will gather as many learning resources as possible using a screen-collect-categorize routine to create pages for breaststroke learning as well as update the teaching tasks and learning contents. Through the internet platform for breaststroke learning and the communication platform, students will receive information, learn on their own, provide feedback, and finally discuss with their teachers and classmates [13,14].

4. Research results and analysis
4.1. Comparative analysis of theoretical knowledge scores after the experiment
The acquisition of theoretical knowledge serves as a crucial guide for students as they practice, and it is a prerequisite for students to execute the correct technical movements [15]. The theoretical understanding of technical movements can help students better grasp technical movements, such as the breaststroke movement; it also forms a link with the mind to establish clear and complete movement representations [16]. With regard to this, after the experiment, a 100-point closed-book examination that evaluated the students' theoretical knowledge was conducted. Both groups were given the same amount of time to complete the examination. The scores of the theoretical assessment were subjected to an independent samples t-test for both groups of students. The results are shown in **Table 3**.

Table 3. Analysis of the theoretical assessment scores of the experimental group and control group (n = 120)

Content	Experimental group	Control group	t-value	p-value
Scores	88.684 ± 6.925	79.550 ± 5.206	4.801	0.000

The difference in mean scores between the experimental and control groups following the test, as shown in **Table 3**, is 9.134, with the experimental group having a higher mean score than the control group. SPSS 17.0 was used to analyze the assessment scores of the two groups, in which the p-value was less than 0.05, suggesting that there is a significant difference between the two groups in terms of their basic theoretical knowledge of swimming.

4.2. Comparative analysis of technical movement evaluation after the experiment
After the experiment, both groups were evaluated on the technical movements of breaststroke. The evaluation was divided into two parts: qualitative evaluation and quantitative evaluation. The qualitative evaluation was conducted by swimming experts from the teaching and research department of college physical education by scoring the technical movements of students' breaststroke; the quantitative evaluation was based on the 100-meter breaststroke speed and score control table found in the syllabus of the general swimming course. An independent sample t-test was also conducted on the results of the two groups, as shown in **Table 4**.

Table 4. Analysis of the breaststroke movement evaluation results of the experimental group and control group

Group	Experimental group (n = 60)	Control group (n = 60)	t-value	p-value
Speed (score)	86.421 ± 4.388	75.400 ± 6.548	6.140	0.000
Skill evaluation (score)	88.211 ± 5.462	75.200 ± 6.864	6.527	0.000

According to the data in **Table 4**, the *p*-values of the speed score and breaststroke technical movement evaluation in both the experimental group and the control group were less than 0.05. This means that after the experiment, the technical evaluation results of the experimental group and the control group showed significant differences. Therefore, it can be concluded that the teaching intervention of the "Internet Plus Swimming" teaching model played a role.

4.3. Comparative analysis of students' independent learning ability before and after the experiment

According to the Likert chart (**Figure 4**), the independent learning ability of students was rated as follows: "excellent self-learning ability" scores 5; "good self-learning ability (needing supervision)" scores 4; "average" scores 3; "poor self-learning ability" scores 2; "very poor self-learning ability" scores 1 [17]. The percentage of students with good self-learning ability and above was 42% before the experiment, and it increased by 28% after the experiment; the percentage of students with poor and very poor self-learning ability was 15% before the experiment.

	Excellent self-learning ability	Good self-learning ability	Average	Poor self-learning ability	Very poor self-learning ability
Before the experiment	13%	29%	27%	9%	6%
After the experiment	25%	45%	30%	0	0
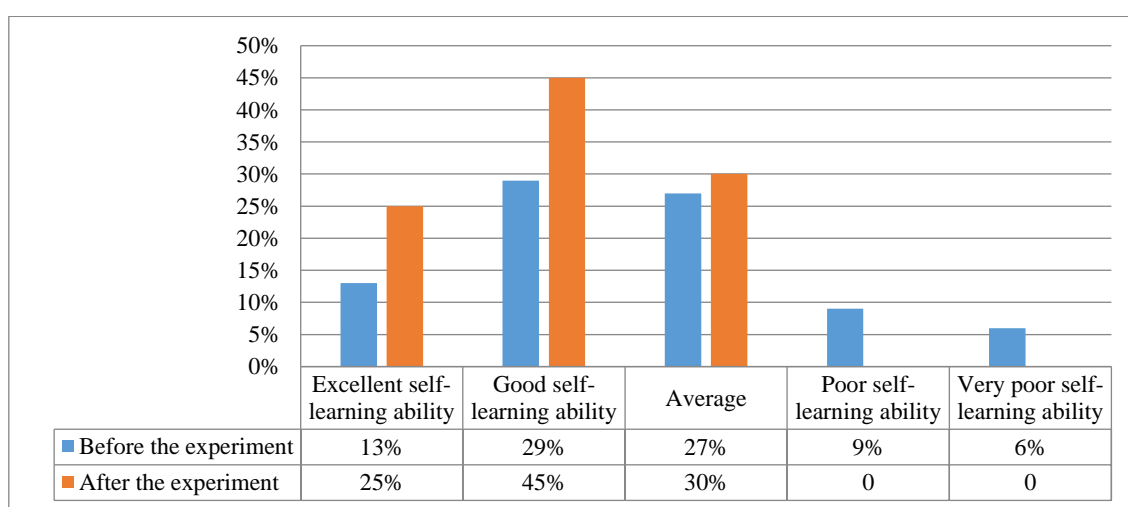
Figure 4. Graph of students' independent learning ability in the experimental group before and after the experiment (n = 20)

5. Conclusion

Several conclusions can be made from this study.

(1) The integration of multimedia learning resources, the use of information technology and mobile devices, as well as the establishment of the "Internet Plus Swimming" teaching mode implemented in general swimming courses in colleges and universities are effective and show feasibility.

(2) The application of the "Internet Plus Swimming" teaching mode can pique students' interest in learning, their enthusiasm to participate during swimming lessons, and at the same time cultivate their independent learning ability.

(3) The establishment of an internet learning platform with information on swimming realizes the close connection between online swimming teaching and offline teaching as well as the integration of the internet teaching mode and the traditional teaching mode, which provides a feasible and realistic foundation for the informative reform of physical education.

(4) The "Internet Plus Swimming" teaching mode achieved the expected teaching effect and improved the teaching quality of the general swimming course.

Disclosure statement

The authors declare no conflict of interest.

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