Retraction

Retracted: Study on the Integration of Computer-Assisted Teaching Methods for Teaching Volleyball in College Physical Education

Mathematical Problems in Engineering

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope

(2) Discrepancies in the description of the research reported

(3) Discrepancies between the availability of data and the research described

(4) Inappropriate citations

(5) Incoherent, meaningless and/or irrelevant content included in the article

(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] J. Zhang, "Study on the Integration of Computer-Assisted Teaching Methods for Teaching Volleyball in College Physical Education," *Mathematical Problems in Engineering*, vol. 2022, Article ID 5028705, 8 pages, 2022.

Research Article

Study on the Integration of Computer-Assisted Teaching Methods for Teaching Volleyball in College Physical Education

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Computer-aided network (CAI) teaching method is to establish a volleyball teaching forum on campus network, upload graphic materials related to volleyball teaching, combine inside and outside classes, and combine teaching with self-study. This article studies the volleyball teaching of physical education in colleges and universities by comprehensively using the computer-aided teaching method, and discusses its role in improving the teaching quality, interest, and self-study ability, to improve the teaching effect. The results show that the computer network teaching method is an effective supplement to the teaching mode of students' autonomous learning and cooperative learning. It is an effective way to fully mobilize students' subjective initiative and improve the effect of volleyball teaching. At the same time, it is considered that the key to popularize and develop this teaching method is to improve the computer operation standards of physical education teachers.

1. Introduction

With the continuous promotion and application of computer network technology in various fields, the reform of physical education classroom teaching with computer-aided instruction (CAI) as the main feature is imperative [1]. Demonstration effect is one of the important characteristics in the process of physical education teaching. Students can constantly correct and improve their actions through teachers' demonstration, to achieve a better physical education teaching effect [2]. Teachers' energy is limited, as well as the limitations of space, class time, and class size, which may be the factors limiting the effectiveness of physical education teaching. How can students see enough presentations and have enough time to learn and imitate [3]? How to stimulate students' enthusiasm and interest in learning and make sports a habit in their daily life have become an urgent problem to be solved in college students' physical education at this stage [4].

With the increasing maturity of computer network technology and its popularization in various fields, physical education teaching methods based on classroom teaching and supplemented by computer teaching have emerged [5].

At present, the main way of physical education teaching is that teachers personally demonstrate in class and students imitate teachers' actions [6]. Teachers need to remind and correct students' actions and practice repeatedly to achieve better results [7, 8], [9–11]. Therefore, at this stage, several problems need to be solved in physical education teaching: how to give students enough time to learn and imitate correct actions; how to improve students' enthusiasm and interest in sports; and how to make sports become a part of students' daily life. Students' enthusiasm for learning and interest in sports will become an indispensable part of their daily life [12].

The purpose of computer network (CAI) teaching is to mobilize students' passion and love for physical education learning, improve students' volleyball technical ability, make students good at finding problems in the learning process, cultivate students to think independently, analyze problems, solve problems, find the fun of volleyball in the course of lessons, understand volleyball more deeply, discover the laws of volleyball, and develop the awareness of their exercise [13]. The main way of online teaching as described in this article is to upload image materials, text materials, and video materials in the volleyball section of the campus network for
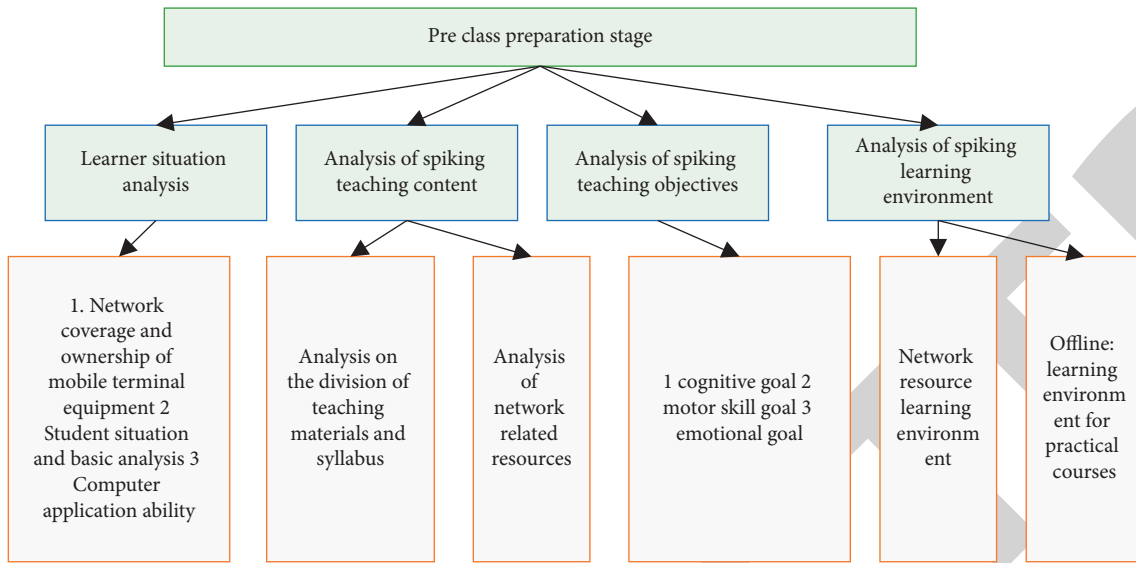
FIGURE 1: List of preparation contents in the pre-course preparation stage.

students to learn [14, 15]. The machine network teaching method supplements the insufficient part of in-class learning, enhances students' independent learning ability, fully mobilizes students' subjective initiative, and then achieves volleyball teaching effect [16, 17]. Therefore, in this article, we choose students who took volleyball as a physical education elective to conduct a study to explore how the computer network (CAI) teaching method can improve teaching quality, cultivate students' interest in volleyball and their ability to learn volleyball by themselves, achieve teaching purposes, and provide teaching opinions [18, 19]. In view of this, this study takes volleyball elective students as the experimental subjects to explore the promotion effect of the computer network (CAI)-assisted teaching method on improving the teaching effect of students' volleyball techniques, and to provide a reference for the reform and development of physical education courses in higher education institutions [20].

2. Detailed Construction and Analysis of the Teaching Model of Volleyball Bucketing Technique

2.1. Pre-Course Preparation Stage. The pre-course preparation stage is the first step of constructing the teaching mode of the Internet + volleyball bucketing technique, and it is also the front-end preparation. The design diagram of the pre-course preparation stage is shown in Figure 1.

It is important to improve the complete learning experience in the pre-course preparation phase as an indispensable part of the constructed Internet + volleyball bucketing technique teaching model. The analysis of learners' situation is mainly about the school network coverage and students' ownership of mobile devices, the availability of the basics of snapping learning, and the ability to use computers. Whether the student learning environment has network coverage and the student's ability to

simply use the computer are important factors affecting the quality of learning, and the learning of the Internet + bucketball technology learning resources integrated into the teacher is based on the network and the equipment to provide support. Internet mobile terminal devices are the receivers at the end of the students, such as computers, smartphones, and tablets. These devices provide online technical support and are the key factor in achieving "Internet+."

In the new context of building a new teaching mode of buckling technique, the analysis of teaching content is divided into the analysis of traditional teaching materials and teaching progress, and the analysis of Internet learning resources of buckling technique. The dunking technique can be divided into five parts such as preparation posture, running, jumping, aerial strike, and landing. Through watching experts' video resources, interviewing experts, and reading textbooks, it is found that it is more difficult to learn the consistency of swinging arm, control of human ball distance, and the striking part when learning arm whipping action; to master the height of the step and pace rhythm when learning running and jumping, and to learn the timing of jumping, aerial strike, and the control of the human ball distance when learning complete dunking.

2.2. Pre-Class Self-Learning Stage Based on Learning Task List. The pre-class self-learning stage based on the bucketing task list (Figure 2) is the most critical part of building the Internet + volleyball bucketing technique teaching model, and this stage is an important stage for students' knowledge self-construction and ability development.

There are four main steps in the production of the online learning platform of bucketing technique: the first step is the collection of Internet video resources of bucketing technique (including Gif motion pictures), videos recorded by famous teachers, text, patterns, and picture resources of bucketing technique learning. The second step is to process and classify
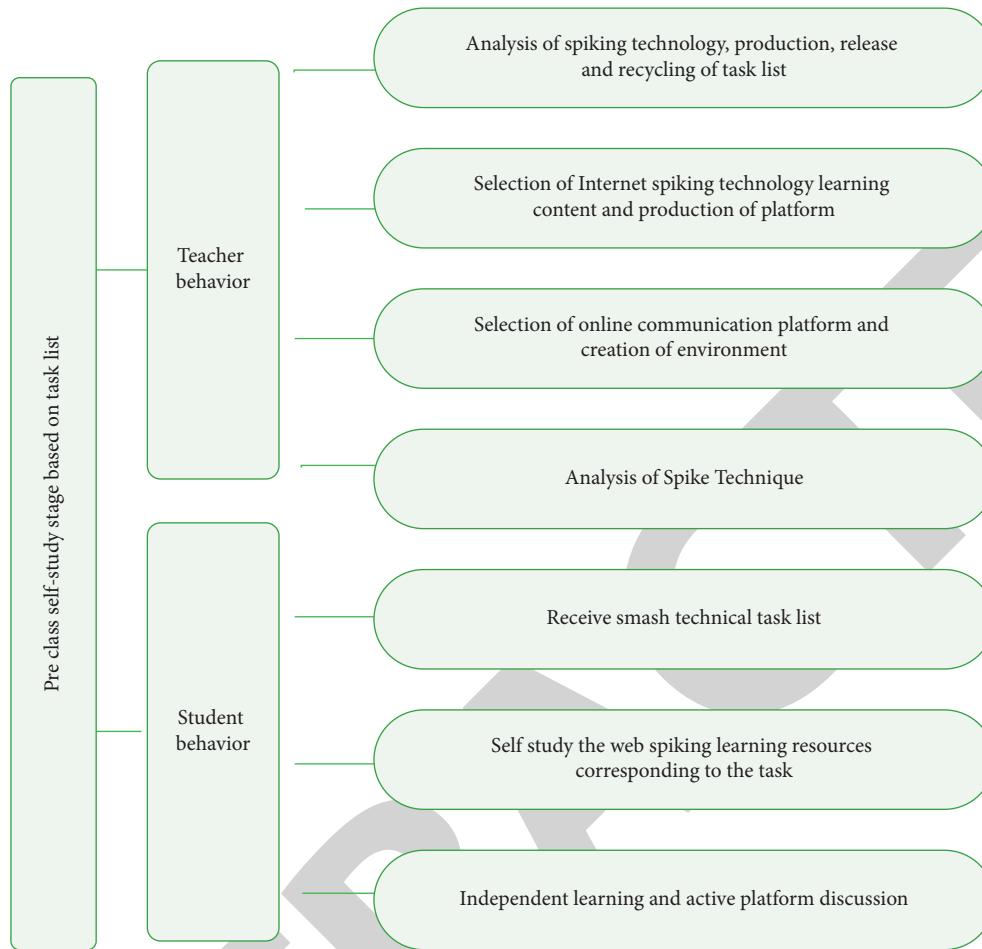
Figure 2: List of teacher and student behaviors in the pre-class self-study stage.

the resources by using information technology (such as editing software and image processor) and auxiliary tools according to the teaching progress of bucketing technique and students' situation. In the third step is to analyze the teaching content, carry out the teaching expected results vision, and integrate the resources, such as the layout of video text and pictures of the swinging arm whipping action. The fourth step is to create a web page using Dreamweaver to compile the classified snapping technique required to visualize intuitively and classify with clear knowledge points (Figure 3.

The video resources should not be too long and can come from the videos on Youku, Akiyip, Tencent, or other platforms about teaching content, the videos recorded by famous teachers on the teaching of bucketing technique, and the bucketing teaching videos quoted by other online learning platforms. The viewing time of the integrated video resources is limited to 10 minutes in learning, and cultivate their feelings about sports.

Online learning resources must be selected and self-built according to the requirements of the syllabus and teaching objectives, and coincide with the teaching content of offline face-to-face teaching, and the online learning resources constructed should fully reflect the richness, sharing, and openness of the Internet resources.

The editing of board settings and content is the key point of the effectiveness of web page production. The whole layout of the web page should be simple and clear, not too cumbersome, and students can form a clear cognition through learning. The author's web page for learning the snapping technique is shown in Figure 4.

3. Analysis of the Effects of Teaching Volleyball Bucketing

3.1. Research Object and Method. The research object is to study the application of the computer network (CAI) teaching method to assist volleyball teaching in colleges and universities. For the determination of the experimental group and control group, four teaching classes of volleyball elective courses in our school were randomly selected, two classes as the experimental group and the other two classes as the control group (Table 1).

Before the experiment, a diagnostic survey was conducted in all four classes to understand the initial level of students' volleyball. The results showed that the students' volleyball skills in the four classes were basically in synchronization, and more than 80% of the students did not know how to play volleyball; three experts were asked to evaluate the basic volleyball skills of the two groups of
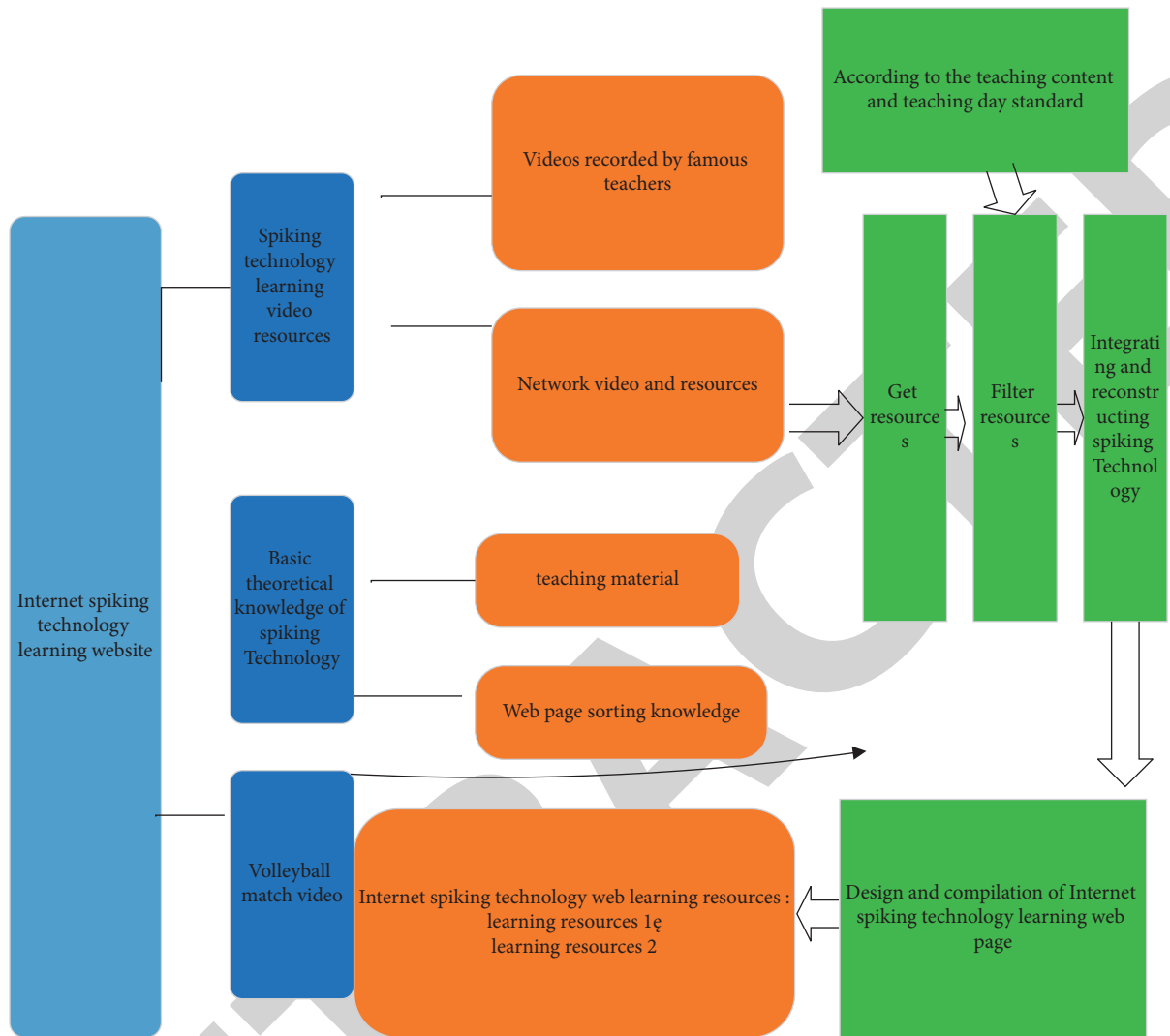
FIGURE 3: Diagram of the process of creating a web page for learning Internet bucketing techniques.

students before the experiment, and the experts thought that there was no significant difference between the skills of the two groups of students; and both groups of students qualified to complete the study and assessment of the compulsory freshman physical education course, which were 50 m running, front throwing solid ball, 12 minutes running (men 2400 m, women 2000 m). The results were analyzed and the students in both groups completed their freshman physical education courses, including 50 m run, solid ball throw, standing long jump, and 12 minutes run (2400 m for men and 2000 m for women). The analysis of the results showed that there was no significant difference in the special physical quality between the two groups of students. From the above raw volleyball technical level, technical evaluation, and special physical quality of students, the test conditions were the same, and the experimental and control groups were determined reasonably and effectively [21–23].

The teaching experiment was conducted on the campus network of Jiaotong University with multimedia audio, video, text, and picture resources, mainly including volleyball teaching videos by Professor Ge Chunlin of Beijing

Sport University, volleyball training videos by Wang Jiawei, former head coach of the national men's volleyball team, and teachers' teaching videos. Both the control group and the experimental group were taught by the author of this article, and both the control group and the experimental group were taught 32 hours (90 minutes/2 hours/week, 16 weeks in total). The on-site survey revealed that 100% of the students in the experimental group had easy access to the campus network, which provided the necessary material basis for the smooth implementation of the teaching experiment.

The experimental group adopted the "computer network (CAI) teaching method" to assist in teaching. The teacher first taught according to the traditional physical education process, except that on the basis of students' basic mastery of passing and matting techniques, students were allowed to try to serve and dunk the ball according to the online materials, log on to the homepage of "Zhixing BBS Forum" on the campus network and enter the "Volleyball World" section. "Through the comparison with the correct movements, they can find out their shortcomings and give feedback to the forum in time, so that teachers can understand the students'
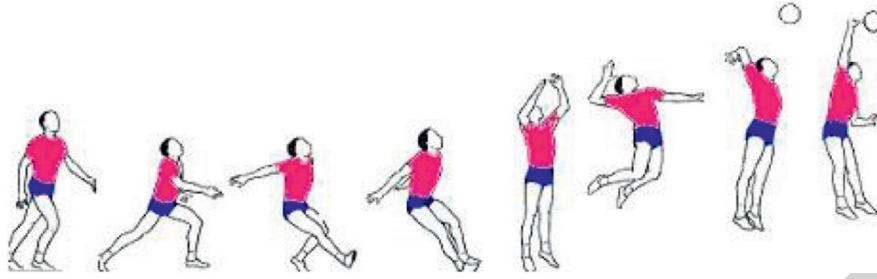
Figure 4: Screenshot of the dunking technique learning page.

Table 1: Sex and age distribution of experimental subjects.

	Boys/ person	Girls/ person	Total/ person	Age/year
Experience group	28	36	64	20.00 ± 0.62
Control group	33	31	64	20.00 ± 0.45

situation in real-time and formulate corresponding teaching contents and methods, and focus on practicing in the next class. Repeat this process many times until the examination [24].

The control group used the traditional physical education teaching method, i.e., the combination of explanation and demonstration and practice to correct errors, to teach the four techniques of volleyball matting, passing, serving, and dunking, and finally, the test was conducted uniformly with the experimental group.

Therefore, it is important to measure and assess the students' learning effectiveness. The assessment of the scores of the experimental and control classes' sinking techniques was evaluated by qualitative and quantitative methods. The assessment of the qualitative scores was mainly evaluated by the scores of the two volleyball experts invited, while the quantitative assessment was to specify the number of sinking balls and count the number of valid balls. The paired samples *t*-test with a 95% confidence interval was used to evaluate the scores of the experimental and control classes' snapping technique, and the results of the analysis are shown.

According to the analysis results of Table 2, the results of the deduction of the experimental class show significant differences in the quantitative evaluation after the experiment, while the clocking performance of the control class also shows significant differences. But the number of spike in the experimental class is lower than that of the control class before the experiment. The number of the deduction of the experimental class is higher than that of the control class after the experiment, and the increase is larger, which indicates that the Internet plus volleyball spiking technique teaching mode is applied in the teaching of smash skills. It can improve the effect of students' learning spiking. From the analysis of the technical evaluation results, there is a significant difference between the test results of Expert 1 and Expert 2. From the analysis of the test results, we can see that the technical assessment scores of the experimental class before the experiment were lower than those of the control

class, but the technical assessment test results of both the experimental class and the control class after the experiment were better than those of the control class, and the difference between the mean values of the experimental class and the control class before and after the experiment were 2.58 and 2.11, showing a difference, which can indicate that the growth of the level of the bucketing technique of the experimental class was greater than that of the control class [25, 26].

3.2. Results and Analysis. The assessment of the experimental and control classes was conducted separately so that they could not interfere with each other. The four techniques of pad, pass, serve, and dunk were scored independently and the scores obtained were averaged.

In the comparison of the scores of the four techniques of padding, passing, serving, and dunking of the players in the experimental and control classes, the players' mastery of these four techniques could be seen (Table 3). The experimental group and the control group showed significant differences ($P < 0.05$) in the scores of three techniques, namely, matting, passing, and serving, which indicated that the computer network (CAI)-assisted teaching method was beneficial to the players in learning and mastering these three volleyball techniques, while the statistical difference between the scores of the two groups in the spiking technique was not significant and not statistically significant. The reason for this is that the dunking technique is more likely to be affected by the players' perceptual ability, which makes it more difficult to master, and the CAI-assisted teaching method cannot fully play its supporting role in the teaching class.

Table 4 shows that the comparison between the experimental group and the control group is also obvious, according to the standard of student's performance set by the school's Academic Affairs Office, the students are classified as: 90–100 as excellent; 80–90 as good; 70–80 as moderate; and 60–70 as poor. The specific assessment data were 15 students in the experimental group and 6 in the control group with the excellent grade; 30 students in the experimental group and 22 in the control group with the good grade; 11 students in the experimental group and 24 in the control group with the medium grade; and 2 students in the experimental group and 6 in the control group with the poor grade. It can be seen that the computer network (CAI)-assisted teaching method has helped students in the

Table 2: Comparison of the results of the before-and-after bucketing technique test between the experimental class and the control class at a glance.

Content		Before experiment ($n = 18$)	After experiment ($n = 18$)	After $x = $ before x	t value	P
Spiking skill evaluation 1	Experimental class	2.13 ± 0.29	4.75 ± 0.10	2.68	−16.520	0.000
Spiking skill evaluation 1	Contrast class	2.16 ± 0.38	4.29 ± 0.36	2.12	−17.655	0.000
Spiking skill evaluation 2	Experimental class	1.51 ± 0.56	4.18 ± 0.31	2.78	−16.498	0.000
Spiking skill evaluation 2	Contrast class	1.68 ± 0.58	3.35 ± 0.46	2.71	−7.446	0.000
Up to standard	Experimental class	1.52 ± 1.03	4.19 ± 0.88	2.69	−7.665	0.000
Up to standard	Contrast class	1.68 ± 1.45	3.36 ± 1.01	2.29	−3.178	0.000

Table 3: Difference test of the four technical scores ($x \pm S$) between the experimental and control groups.

Group	Number of people	Cushion	Pass the ball	Serve	Spiking
Experience group	64	82.68 ± 5.88	88.5 ± 3.6	83.55 ± 8.98	66.23 ± 8.29
Control group	64	78.8 ± 5.69	80.9 ± 6.9	76.59 ± 6.89	66.66 ± 5.58
t		−2.686	−2.088	−3.088	−0.107
sig.		0.019	0.032	0.003	0.896

Note. *indicates a significant difference in technical scores between experimental and control groups ($P < 0.05$).

experimental group to improve their performance, and the number of students who got excellent and good grades in the final examination was significantly higher than that of the control group, which can be said to have achieved the expected vision of the teaching experiment.

Students use the BBS system to access the volleyball forum for computer network-assisted teaching. Students can access the campus network in various ways: laptops, tablets, and even cell phones, and learn volleyball techniques and knowledge freely anywhere and anytime. The frequency of students' access to the BBS system (Table 5).

Therefore, the establishment of a volleyball BBS on the campus network is an effective way of computer network (CAI)-assisted teaching method. The main function of the forum is to allow students to discuss and communicate freely, in this section of the volleyball BBS, about volleyball techniques that cannot be adequately conducted in class. Of course, this free discussion and speaking are only possible within the teacher's control. Teachers can use their class time to upload more videos, pictures, texts, and other materials related to the classroom content to the volleyball BBS in the form of postings. At the same time, students can also spontaneously search for more volleyball information of interest on the Internet and upload it under the intervention and guidance of teachers for other students who log on to this forum to share, thus changing the scope of traditional volleyball classroom teaching and making volleyball techniques, tactics, physical training, theoretical knowledge, and many other aspects fully shared on the Internet, becoming an indispensable supplement to physical education classroom teaching in the new situation This has become an indispensable supplement to physical education classroom teaching in the new situation (Table 6).

Through the Internet (for example, the establishment of a small website for everyone), volleyball teaching can make full use of its convenient and widespread characteristics, with classroom teaching as the main focus and volleyball forums as a supplement, guiding students to pay attention to volleyball forums and develop the habit of browsing volleyball forums to

Table 4: Comparison of the total scores of the final examination of the experimental and control groups.

Fraction	Experience group		Control group	
	Number of people	Percentage (%)	Number of people	Percentage (%)
90~100 (excellent)	24	26.9	8	11.5
80~90 (good)	32	52.8	25	38.6
70~80 (average)	15	19.8	29	44.5
60~70 (poor)	3	3.6	8	10.9

achieve better teaching results. At the beginning of the forum, teachers should fully mobilize students' enthusiasm and assign browsing the volleyball forum as a class assignment. At the same time, teachers should pay attention to the quality of posts, which should be relevant, practical, and interesting, so that students can get more knowledge and increase their interest in volleyball by browsing the forum. The teaching mode of the forum is a good solution to the problem of continuity of teaching based on in-class teaching, which makes teachers and students fully interact and form a virtuous cycle, gradually making the forum not only a platform for spreading knowledge, but also a communication platform for students to actively participate in the construction of the forum and join the ranks of spreading volleyball knowledge, and participation in the forum is not limited to students who take the course, but any other students interested in volleyball knowledge can participate in it. Any other students who are interested in volleyball knowledge can participate in it, which also makes the forum teaching mode have a wider meaning. Through the summarization of the questionnaire results and the statistics of the data, it is found that the volleyball forum is a good solution to the problem of the limitation of classroom teaching, and it is a teaching method for students to receive volleyball knowledge delightfully.

Table 5: How and how often students use the BBS system to log into the volleyball section.

Investigation content	Option content	Effective number (62 persons)	Percentage (%)
Mobile terminal login	Used	25	42.8
	Not used	37	59.8
Fixed computer login	Used	62	100
	Not used	0	0
Login frequency of BBS volleyball section	Less than once a week	0	0
	Once a week	22	38.5
	Twice a week	28	49.8
	More than three times a week	12	17.6

Table 6: Reasons for students to visit BBS volleyball section.

Reason for visit	Effective number (62)	Percentage (%)
Acquire relevant knowledge of Volleyball	62	100
Keep in touch with teachers and classmates	38	61.1
Participate in the discussion of relevant volleyball games	31	50
Have problems that need teachers' help to solve,	29	49.2
Others	6	11.2

4. Conclusions

Computer network-assisted instruction is an effective supplement to the traditional physical education teaching mode, and the teaching experiment effect is remarkable. The application of computer network-assisted volleyball teaching is a further improvement of traditional teaching methods. It is a teaching method to optimize the teaching effect by using modern teaching means. Computer network (CAI)-assisted teaching method can fully mobilize students' subjective initiative, improve students' ability to learn volleyball technology, cultivate independent thinking ability, enable students to find problems in observation, analyze problems in thinking, and solve problems in practice, which is helpful for students to further understand volleyball, find rules and cultivate the consciousness of lifelong physical exercise.

Teachers should pay attention to the improvement of their quality, establish the awareness of modern sports information, combine professional knowledge with modern educational technology, create a network teaching sports resources, and let more students learn sports knowledge better through the network. If possible, teachers should receive systematic computer network course production training to improve their network course production level. Schools should allocate more sports network resources, such as campus network services, establish sports network media courses, and realize the modernization of college sports teaching.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

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