

# Influence of the Internet based Multimedia Technology on Teaching Reforms and Management of Physical Education

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## Abstract:

Internet based multimedia technology has emerged as a strong source of teaching methods in learning physical and sports education. Due to its global use in sports and physical education, multimedia technology has transformed the whole gamut of sports learning. Several universities have initiated study reforms in sports teaching and begun to focus on the use of multimedia technology in physical education. Adequate steps are taken to explore new ways to use multimedia technology for physical education and find a new direction in studying physical education in universities. Research studies have also emphasized upon the use of multimedia technology for the development of physical education. Evidences suggest that multimedia technology can stimulate students' interest in learning and is more conducive to students' understanding and mastery of professional knowledge, develop their physical potential, and improve the overall classroom teaching quality. This paper attempts to study how internet and network based multimedia distance education methods can be used to reformulate the physical education syllabus and check the falling number of technical courses in physical education learning. Using both qualitative and quantitative methods of data collection, this study carried out documentation research, in-depth interviews and comparative experiment method through experimental and control groups. Limitations faced in the study included site restrictions, lack of hardware facilities and inadequate teachers' professional knowledge and skills of multimedia technology. The study suggests that multimedia technology should be appropriate and depending on the content of the teaching. The physical education teachers should upgrade continuously their professional knowledge and skills of the cutting-edge sports technology. Only by optimizing the combination of multimedia technology and traditional physical education, it is possible to educate students on sports knowledge and skills and increase the interest, efficiency, and initiative of students' learning.

**Keywords:** China Internet, multimedia technology, teaching methods, reforms, physical education

The use of computers and the Internet has become indispensable to the development of modern society, particularly in the educational domain where multimedia technology [1, 2] is widely used in the form of audio and video teaching aids and other modern educational multimedia gadgets. Due to their specific expressions, rich and colorful graphics and presentation techniques, these teaching aids motivate teachers and students for learning. They also build up an environment of learning and development and offer a new understanding and thinking to teaching methods, how students learn, how teaching content is presented, and how teachers and students interact. These teaching aids have a positive significance especially in the domain of physical education.

The teaching process in physical education [3, 4] is a unique process of teaching and learning between teachers and students. It directs how to transfer sports knowledge and skills to students through good practices of physical education and

facilitate students' learning and accomplishing mastery of knowledge independently. However, owing to the changing times and emergence and popularization of multimedia technology, it is imperative to devise new teaching methods for physical education teachers in order to help them adopt better methods of teaching sports knowledge and skills. Such a transition and progress reflects the "health-first guiding ideology" of physical education even in its teaching. Students need to gradually acquire a "lifetime body and thoughts" through a pleasant physical education class. Physical education teachers also must continuously improve their teaching and use innovative teaching methods. The use of multimedia technology has made it possible. It promises to replace the past mechanical and single teaching methods with such novel and innovative methods that will mobilize students to participate in sports learning activities more intuitively and vividly.

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Students in a learning environment are characterized by intense competition and strong imitation skills. The powerful influence of computers and multimedia such as sound, light, color formulate students' psychology and stimulate their interest in learning until they satisfy their intense curiosity. Such a healthy psychological state of mind is the internal factor in the teaching process, and teachers are external factors. In short, multimedia teaching methods have changed the teaching and learning methods as well as learning platform. Multimedia technology in physical education [5, 6, 23] employs visual and intuitive multimedia courseware and uses a language assisted by vivid and concrete graphical images. The integration helps in describing technical aspects of sports education along with enriching students' perception and enhancing their understanding of the subject.

Prior to introduction of multimedia technology in sports education, teachers found it difficult to bring change in students' learning, or change technical movements from static to dynamic. The multimedia made learning more intuitive and comprehensive, highlighting the key points and difficulties of learning. It helped students avoid being ridiculed because of their faulty actions or errors of technical movement, as they could now better understand physical education activities. The universal application of multimedia technology in the domain of physical education has changed transformed the teaching and learning modes paved the way for physical education reforms. Multimedia teaching is therefore worthy of research and exploration, to find out how it can provide students with a still better learning environment and how it can assist teachers to explore truth and cultivating students' inquiry spirit and creative thinking ability. It is important to investigate how students can make better use of the advantages of multimedia technology to broaden their horizons and develop their individuality. A research study such as the present one can optimize the combination of multimedia technology with traditional physical education in order to help educate students develop knowledge and skills related to sports education. It will also expand the time and space boundaries of physical education and teaching, and increase the interest, efficiency, and of students' power of taking learning initiatives.

## Related work

### *Theoretical overview of multimedia teaching methods*

Multimedia teaching methods has been in use for a long time. In initial stages, teachers used only sound, picture texts, and other graphics to teach. However, in 1980s, electronic media

such as recording audio and video, projectors, slides, etc. began to be used in classroom teaching. This teaching method was defined as e-learning or Multimedia combination teaching. In 1990s, computer technology got integrated with education and teaching and spread at high speed throughout the country. Since then multimedia computers have been widely used in different types of teaching which changed the process of multimedia teaching drastically. Multimedia teaching is now based on teaching objectives and learning outcomes. The selection of a teaching process now depends upon the teaching objects' characteristics such as the teaching design, selection of teaching media compatible to computers, video display stands, projectors and other equipment, graphics, images, sounds, texts, animations, and other media. These entire objects combine together with traditional teaching methods to optimize the teaching and learning of a variety of media information. It also helps to form a reasonable teaching structure—optimized teaching effects enabling students to participate in the whole learning process [7, 24, 33].

### *Teacher's perspective*

Such teachers who have a clear idea about their roles can make optimum use of multimedia teaching methods. In educational settings, teachers play a dominant role in supporting education and learning. The guiding role of teachers runs through the whole process of educational activities: it includes stimulating interest in students for new teaching methods, guiding students through learning stages, and consolidating and improving after learning is completed. Hence, prior to using multimedia teaching methods, teachers should first understand students' physical and mental development needs. They should be good at discovering students' doubts and dilemmas, should be flexible and ingenious in answering questions, and should stimulate students' attention to multimedia teaching to achieve the set goals.

Physical education and health curriculum should always pay attention to students' non-intellectual factors and emphasize upon their emotional experience in pursuing educational activities. However, in traditional teaching methods, too much attention is paid to students' academic learning. Students' non-intellectual factors such as students' character, belief, perseverance, morality, and competition and cooperation are neglected. The guiding ideology of modern education emphasizes the relationship between giving and receiving. In teaching, too, there is a need to emphasize upon the relationship between students' personality and the promotion of their social morality. Teachers should adhere to a people-oriented guiding philosophy, to treat students equally,

respect their subjective status, build a democratic and harmonious relationship between teachers and students, pay attention to differences between individual students, teach them well, and pay more attention to the overall development of students.

The purpose of educational activities is to help students acquire knowledge and develop learning ability. Hence, in multimedia teaching, students need to be guided to achieve self-learning, and self-education. When self-education is realized, lifelong and sustainable education can only come all-around way in students' continuous development.

#### *Student perspective*

Students occupy the central position in the learning and teaching process. Students are the protagonists of teaching activities, while teachers serve towards their development. As the main body of growth and learning, students are expected to learn how to internalize classroom's external factors into their learning needs. The future society requires innovativeness and creativity. Modern multimedia teaching methods provide opportunity of innovation by developing students' creative ability. Students should therefore start with themselves taking initiatives to learn new content and match up with the teacher's teaching speed. They should take subjective initiatives to actively learn classroom knowledge since after the end of the learning process, this learning will be put into practice. They should use divergent thinking to seek new knowledge and expand the current knowledge. In this way, they can transform their learning habits, and develop their understanding.

Multimedia teaching methods depend much on the way teaching is organized in its form. A good multimedia teaching organization leads to a good impact of teaching. When using multimedia in physical education, for instance, teachers should first guide students to watch the complete demonstrations of technical movements needed to making of an excellent basketball player. Subsequently, they should be explained the organization form while watching the teaching video. The organization form must not be presented before watching the teaching video, or it might lead to students' pre-entry and direct vision of students. If done after watching the video, it is easier to address to post-recording feedback; adjust to the perceptual and technical actions based on students' situation. Moreover, multimedia teaching methods can also attract students' attention and stimulate learning interest to a certain extent compared with traditional teaching methods. However, considering students' level of engagement and the relative long-term nature of teaching, a rich and varied teaching organization

must be adopted to promote the a peaceful and sustainable development of the teaching process.

#### *Overview of multimedia teaching research*

##### *Research on the Status Quo of Multimedia Teaching in Foreign Countries*

In 1946, world's first electronic computer was successfully developed, mainly to solve complex computing matters. In 1958, world's first computer teaching system was successfully launched. It was the beginning of computer-aided education, mainly for primary school students to learn binary services. In 1971, the first microcomputer was invented, which accelerated the process of computer-aided teaching. The application of multimedia in education and schooling was thus rapid. In 1980s, microcomputers developed again and became more popular. Students were required to use computers and laptops in classrooms. This was the beginning of the realization of multimedia in education and teaching. In 1990s, most of the students abroad obtained teaching resources from the Internet, not form the printed text books, and discussed lessons with teachers and peers over computer terminals. Thus schools, families, teachers and students were closely connected to one another which reduced communication barriers. Multimedia further developed in the 21st century, when countries started paid more attention to education through science and technology. The multi-mediatization of schooling and teaching through new media started developing rapidly. So far, among all countries, the United States has taken the lead in multimedia teaching [8]. The two main aspects of multimedia teaching research in the United States are interactive multimedia technologies and the Internet.

The UK is closely behind whose advantage is that its government and the community provide support and assistance to multimedia teaching. For example, the UK government has enacted laws to encourage practical application of multimedia teaching and build a training system for teachers' multimedia knowledge and technology. This move made multimedia teaching very popular particularly in secondary and primary schools. From the perspective of scientific research, the UK focuses on the combination of multimedia teaching technology and specific disciplines. In addition to the above points, the UK has also accelerated multimedia teaching as a strategic move to develop its teaching institutions. Japan is another country that has realized the importance of multimedia technology for education and is one of the first few countries to propose "Information education legislation" [9, 10, 28].

While the world recognizes the importance of multimedia teaching, some problems related to it have also been exposed with practical applications. The US Education Application Center,<sup>l</sup> for instance, conducted a nationwide survey of multimedia teaching techniques and found that teachers lacked multimedia teaching skills, and therefore their level of proficiency in classroom was insufficient [11, 12, 29].

### **2.2.2 Research on the status quo of domestic multimedia teaching**

In comparison with global multimedia teaching development, China's multimedia technology started late and its developmental speed was also slightly slower. China was first exposed to multimedia technology in 1980. In 1986, the National Computer Education Research Center for Primary and Secondary Schools was established and under the leadership of Chinese National Education Commission. The Commission researched and explored multimedia teaching techniques in the country. Around 1990, the National Education departments paid great attention to multimedia teaching technology and its significant role. Soon due to the practical application of multimedia teaching, it became a research hotspot [13,].

In 1999, the Chinese national government issued important instructions: to promote the modernization and information of multimedia technology, establish a modern long-distance network education platform, and organize diverse multimedia education using existing educational resources and various informational media means in teaching [14, 27, 30]. By 2005, multimedia teaching had become popular in secondary and primary schools. There were several R&D measures to develop and disseminate multimedia teaching resources and build multimedia skills courses and textbooks for primary and secondary classes [15, 25, 31]. This new multimedia model was promoted in the Chinese education and soon was implemented in classroom teaching [16, 26, 32]. Although China's multimedia teaching has developed to a certain extent, there are still gaps in research and development in countries worldwide.

In the physical education discipline, multimedia teaching could not be initiated until a sports development model was introduced by the National Sports Education system. In early 1990s, e-learning was introduced for the first time in the physical education curriculum. In mid-1990s, computer multimedia technology was applied in physical education and it continued to develop learning and teaching. It was realized that multimedia teaching can achieve the impact on the teaching in line with the current physical education reform

requirements and promote the implementation of physical education reforms. Therefore, multimedia teaching method in physical education discipline was rightly given more attention.

The current study reviewed related research on multimedia teaching methods in foreign language databases and found researchers and experts carrying out research on multimedia teaching methods in abundance. During the last few decades until the present time, multimedia teaching is a part of mainstream research, with last 10 years particularly focusing on research of multimedia simulation technology and virtual reality. Based on the review and analysis of these research studies, following conclusions can be made: the research methods used by both domestic and foreign researchers are mostly experimental methods; the interviews are also based on students' perspective and the effectiveness of multimedia teaching methods; research is carried out on the impact of multimedia on teaching and teaching process. In spite of such research in abundance, scholars still believe that multimedia teaching methods need to be improved, particularly these should be recognized by students. These research studies have contributed greatly to the development of multimedia technology in the form of using more mature methods and designing new teaching practices in the field of education. Taking insights from these research studies, the Chinese researchers too have developed a positive attitude towards the development of multimedia teaching. They have come to believe that a combination of multimedia with physical education will have a good development prospects. It has been evident that multimedia teaching methods enrich the treasure trove of teaching and help in meeting modern education reform requirements, which will significantly promote physical education in China. From a vertical perspective, China's multimedia teaching level is generally low and only very few practical studies focus on theoretical research. This wide research gap has created a barrier in China's development, failing to match with world's advanced levels. This has restricted China's research and application in physical education.

### **3. Research on the Application of Internet Multimedia Technology in Physical Education**

The use of multimedia technology for physical education teaching at college level can make the current boring classroom teaching content rich and colorful, easy to learn and understand. The use of multimedia technology can also assist physical education teachers to visualize challenging concepts and professional tasks in to easier ones, make abstract things concrete, and make the old-fashioned content more vivid. With

the use of multimedia technology, physical education teachers can guide students to participate in various professional sports tournaments. The teachers can formulate such processes for students to explain and demonstrate them how to operate when conditions are feasible. The students can learn to be more diligent and act according to the guidance of teachers. It will also expand their thinking ability and help them to achieve a deeper understanding of learning experience.

### **Research methods**

#### *(1) Documentation Research*

As per the research requirement of the current study, several documents such as books and articles related to this subject were consulted. The databases searched included China Knowledge Network, Baidu Academic, Baidu Document, EBSCO, and like. A lot of documents were also studied on multimedia teaching and learning. This included books on psychology, teaching theory, sociology, network society, school education, modern education technology, modern western education philosophy, sports research methods, statistics, multimedia teaching, etc. All these documents were carefully analyzed to trace the history and development of the research topic of this study. This enabled the researcher to identify problems that need to be solved in further research by conducting relevant experimentation.

#### *(2) In-depth interviews*

In order to test the validity and feasibility of this research topic, several professors and experts of universities' physical education departments were visited. This included six professors, ten associate professors, and four lecturers. They were consulted for the problems that this research study may encounter during the entire research process: from topic selection, constructing the basic research framework, identifying essential evaluation criteria to questionnaire design and the content analysis methods of the data collected. The researcher was benefited greatly with the informative advice given by these experts.

#### *(3) Comparative experiment method*

The objective of the experiment

This research study aims to find out best teaching methods to improve students' enthusiasm for learning sports. For this purpose, it is essential to conduct a comparative research analysis of two methods namely, multimedia-assisted physical education teaching methods along with traditional teaching methods, or only multimedia-assisted teaching methods instead of traditional teaching methods. It is important to

understand which method increases interaction between students and teachers, among the students themselves in a classroom; which teaching method mobilizes students' ability to solve problems in the school and help them to analyze the cause and effects of technical tasks; and which teaching method improves the technical level of students and increases self-conscious learning and autonomy in classroom exercises.

Experimental and control groups

The student participants were sampled randomly from two elective courses for this teaching experiment. In order to carry out the teaching experiment smoothly and ensure its reliability, the students of both courses were tested before the experiment for any significant difference or pre-existence of any critical situation between the two groups. Both the groups were found to be the same in level of learning. The experimental group was taught with the multimedia-assisted method while the control group continued with the traditional one. A sports instructor was appointed to assist in this task.

The two groups were taught for one full semester of physical education. The experimental group was given lesson through multimedia-assisted teaching methods for teaching all types of technical actions and findings were recorded. The control group was taught through traditional teaching methods and relevant data were recorded. The grades of the students in both experimental and control groups were analyzed before and after the experiment to determine the improvement level in their technical skills, in their degree of interest, and their views about the physical education curriculum.

### ***Physical Education Models***

#### ***Traditional physical education teaching mode***

In the traditional teaching model, teachers usually use words, language, movements, and other expressions to impart knowledge to students. Sometimes for the sake of intuition, teachers will use some additional tools such as objects, models, teaching instruments, and illustrations to demonstrate and explain what needs to be defined [17]. The traditional physical education class is mainly the teacher's oral teaching, as shown in Figure 1: The teacher gathers the students to announce the classroom routine. After the preparatory activities, they begin to talk about the technical movements to be learned today. The teachers personally demonstrate the actions and concentrate on the explanations. After the reason, the students are finished. Practice grouping, the teacher observes the student's movements and guides the correction, then the students are free to practice, and the collection is summarized before the class.

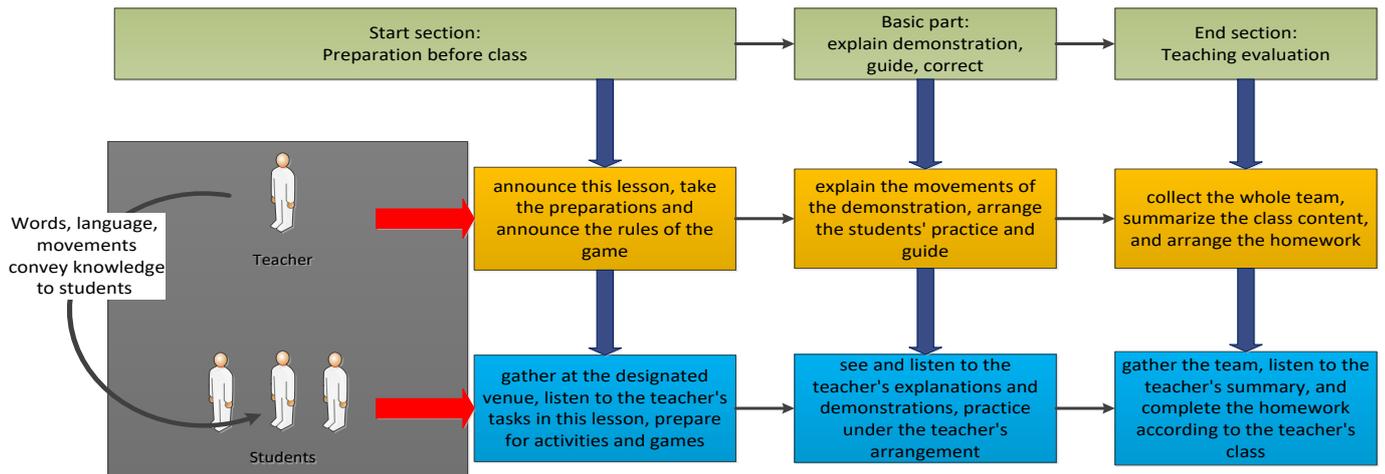


Figure 1. Process diagram of traditional physical education.

Traditional teaching is following this essential process. In this way, the students may have learned and mastered the movements at the class time. However, the course's frequency once a week, the students have forgotten the content taught in the class in the next level, so that the teacher has to start from scratch. Speaking about the previous lesson's content, the students' interest is not as great as the above. The students did not form a deep-level action appearance for the content of the teacher. They did not review the things they learned during class, so they forgot what they had known before the next level. After a semester class, the long summer vacation is enough to forget all the content, so the students will not have much technical action when they arrive in the second semester. The complete set of teaching procedures for physical education includes pre-class preparation, classroom teaching, after-school assignments, after-school instruction, the final assessment of teaching, and student evaluation.

From the flow chart of Figure 1, the traditional physical education method curriculum is relatively dull. From the preparation task of the preparation part to the summary of the execution task and the end part of the primary function, the students are always in a passive position; the teacher How to do it according to what the teacher said, the teacher pushes it, the student moves. In this case, the teacher is just like teaching the child. The initiative of all the links in the class can only be held in his own hands. The teacher teaches very hard, but the students feel that the course is boring, the enthusiasm cannot be mobilized, and naturally, they do not want to participate. When you have free time, you will think about something else, such as playing with a mobile phone or mixing it with other projects to experience freshness. If you want students to study

badminton well, it is the most important thing to be interested in sports.

Of course, traditional physical education teaching methods are not useless. Students follow this teaching method and start to learn straightforward technical actions will be very fast, for example grip method. This kind of teaching method is also suitable for teachers. It is better to grasp the rhythm of the whole class and clearly know what to do next. This kind of teacher-based teaching method will neglect the students' subjectivity and initiative. The entire course is passive to listen to the teacher's arrangement. Students passively learn sports activities. If they don't think about it, they will quickly become too fast. The forgetting action, coupled with the learning movement based on the basis of no interest, is effortless to learn the details of the story, the deformation of the story. After the class is finished, at the end of the lesson, the teacher's summary and comments usually focus on the overall course's overall situation and ignore the details of a course and the timely feedback between the classes, thus affecting the quality of teaching.

### 3.2.2 Multimedia Physical Education Teaching Mode

From the perspective of Figure 2, the multimedia sports-assisted teaching program is also divided into the preparation part, the primary position and the ending part. Still, the multimedia-assisted teaching method requires more preparation before the class. Teachers should carefully look at the syllabus before class and look at many reform trends related to teaching, the status quo of physical education development, and the knowledge of multimedia technology and how to operate some problems. After these preparations are completed, communicate and communicate with the classmates before deciding what further trials are needed. Beginning with the

preparation part, the teacher organizes students to play games related to sports-related courses, mobilizes the students' enthusiasm, and causes students to be interested in this class. Every student can actively participate in it. In the introductory part, the teacher plays the already produced teaching videos, organizes the students to watch collectively, and promptly fast forwards, retreats, slows down, plays back, etc. to explain the action's main points, key facts and difficulties. Students think while watching the video and ask questions in time. After reading it, I imitate the practice with my understanding of the

video, memory, and accumulation of the class. The teacher divides the students into free exercises to take pictures of the students' actions. After the students finish the practice, the students are organized to watch the video again, comparing the differences between the students' actions and the actions of the professional athletes, and then doing an excellent job between the students and the students. Contrast with the low movements, let the students speak out what is wrong with their actions, and propose improvements.

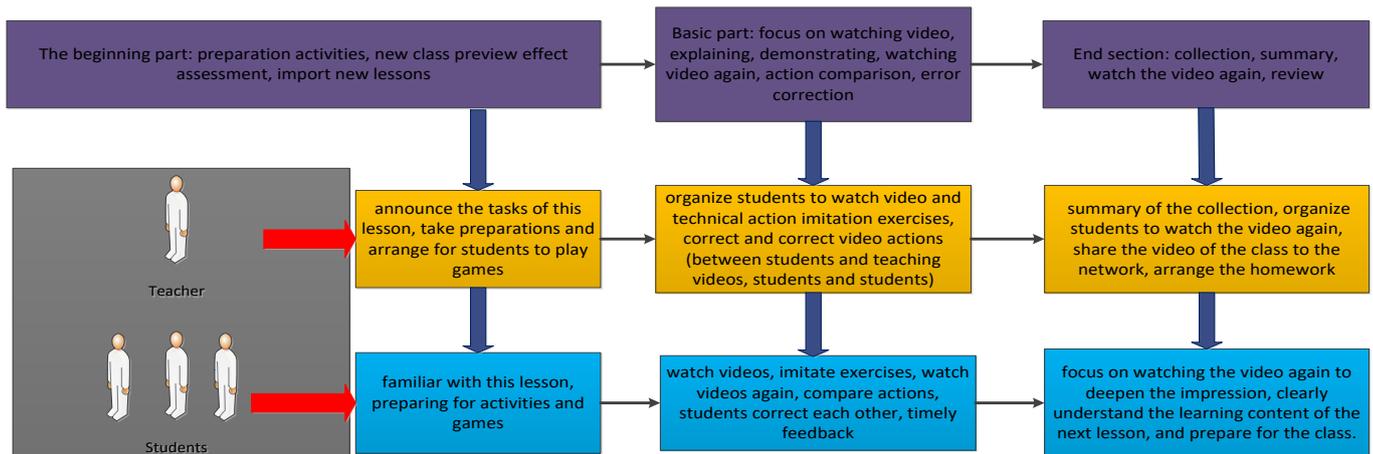


Figure 2. Process diagram of multimedia physical education

Next, give students time to freely discuss what they have learned and exchanges and interactions between classmates and classmates, learn from each other, and learn from each other. At the end of the lesson, the teacher organizes the students to make a summary evaluation. The students themselves say what they have done well and do not do well in this lesson. At the same time, they are required to actively communicate with other students. Create a harmonious classroom atmosphere so that every student actively participates in it; every class has gained, which is more conducive to the rapid understanding and mastery of technology. Finally, the teacher arranges the new content of the next level and arranges the homework. The teacher makes the corresponding counseling under the class according to the students' specific situation so that the students' problems can be solved in time.

**Design of multimedia and information technology teaching mode**

The use of information technology in physical education can improve students' learning, but in modern physical education classrooms, teachers are not skilled in using information technology. This study therefore has utilized the fundamental guiding principles of constructivism [19], humanism [20],

cognitive theory [21], and educational information theory [22], combined with information technology and multimedia teaching aids and the actual situation of physical education classroom. This facilitated the researcher to design a teaching model of information technology for classroom teaching. It was premised that with the help of this teaching model, the teachers can get both theoretical and practical guidance about the adequate and reasonable use of informational teaching content for college level physical education courses. Figure 3 illustrates this teaching model design diagram which combined multimedia technology with information technology.

This design proposed to use network platforms and handheld devices to assist physical education. Modern information technology and network technology are added as a teaching aid based on the pre-existing physical education system. However, the teaching model recommends the specific operation of designing and producing sports technology teaching videos, creating WeChat groups, and making the whole class to join the WeChat group. As a part of the experiment, the teacher would upload a short video of 2-3 minutes of technical teaching through software. The link would be distributed to the WeChat group, and students would use the handheld device to watch this video about technical teaching in the WeChat group.

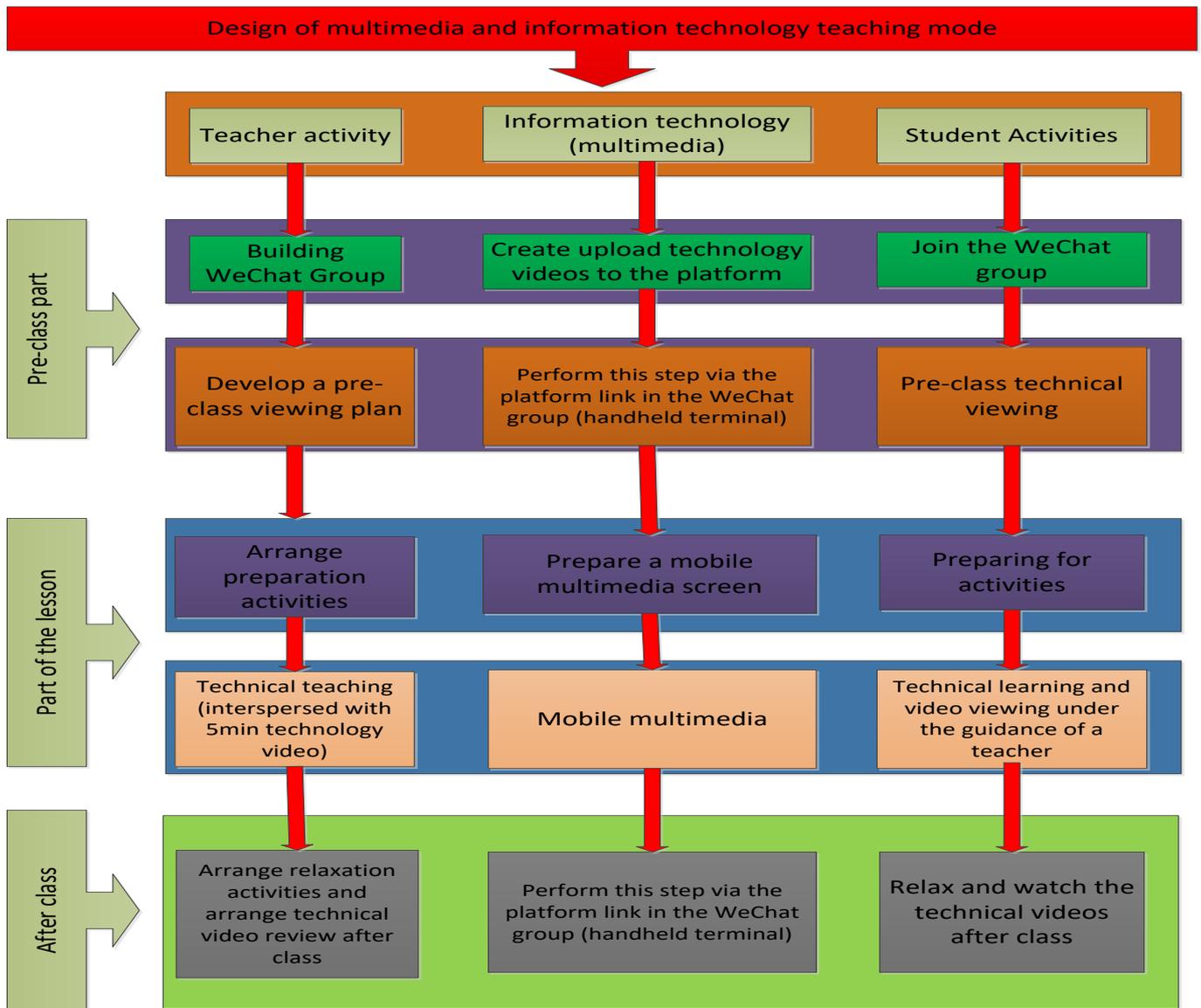


Figure 3.A teaching model design diagram combining multimedia technology and information technology.

This model was prepared to assist in physical education with the following objectives: first, to make use of the popularity of modern information technology and multimedia technology; second, to show that the role of appearance in the development and formation of motor skills is prominent; third, to prove that physical education can be reasonably integrated with information technology as well as multimedia technology and combined with any given situation.

**Pre-class stage**

During the pre-class stage, the teacher prepared small videos showing carious sports skills. The students were arranged properly to understand their basic body postures and movement trajectories. The objective of this pre-class activity was first to develop students' interest in learning and then to maintain their habit of active learning. For the purpose of actual teaching, the teachers prepared curriculum and teaching content according to each student's ability and suitability. The

teaching plan also focused on identifying teaching difficulties and developing such teaching activities that made an impact on students' brain. The process was closely reviewed throughout the semester. Once satisfied, the teacher finally produced small videos. Each video contained the teaching content and the body postures and movement trajectories of sports skills of each student. These videos were uploads on students' learning website, allowing them to study the lessons themselves. The designated website, after opening the browser, could be pre-read according to the teacher's requirement. On the other hand, the control group's pre-class preparations were prepared using conventional activities such as jogging, static pulling, and like.

**Part of the lesson**

The physical education teachers first organized all students and prepared them for learning activities. The students interspersed themselves with respective video technology movements as they learnt simultaneously the technical sports activity behind

such movements. The students could identify and learn the relevant skills required for each sport activity by watching these online videos. Since the students used handheld portable multimedia devices, they could easily memorize each action by frequently replaying actions. Hence, they were gradually mastering the relevant technology to learn physical education.

The traditional teaching had a teaching course content of three parts: technical teaching, group practice, and taking rest. During each learning session, the teacher first used methods like explanation and demonstration. After that, students participated in practice session to learn tennis skills in groups. During the course of practice, the teacher frequently pointed out their mistakes and demonstrated the correct actions.

**After class stage**

The teacher arranged after-school tasks for students in accordance with their classroom learning situation. Some of these tasks included watching the sports skill videos once again using their family (dormitory) Internet or mobile data. They were asked to present their problems online related to sports skills learning. These online sessions were very useful for students to clear their doubts about network technology. The teachers interacted with the students during these online sessions. This improved the efficiency of students' physical learning and helped teachers achieve the desired learning goals. This interaction was also taking place through WeChat group discussion. The use of technology thus redefined the relationship between teachers and students. They got much closer and the learning environment was also more relaxed and energetic.

In the control group, all traditional teaching activities such as regular relaxation and cleaning-up work after class were carried out. The entire teaching process in this group was taking place in the traditional style and no content of information technology or multimedia was adopted.

**Example analysis**

This section analyzes multiple sets of experimental data to verify the influence and impact of multimedia information technology on physical education.

**Student Learning Attitude Analysis**

Table 1 lists the relevant data collected through the questionnaire method after the teaching experiment. This mainly includes students' attitude data on the research-centered teaching method.

It is evident from the above data that students in the experimental group agree and support the multimedia teaching method. They believe that it can help stimulate sports interest in them and improve their performance. Moreover, the survey data of four questions viz., 3, 4, 11, and 12 reveal that multimedia teaching mode has already influenced the experimental group students, and prompted them to actively try to apply this teaching model to other fields of study. Similarly, the data of four questions from sixth to ninth reveal an efficient implementation of multimedia teaching mode which helped to improve the relationship between teachers and students. The multimedia teaching mode also helped students to develop teamwork skills among students. The data also reveal that after the students had learnt the primary decomposition of sports technology, they used the camera equipment to record their training movements. Such videos are particularly helpful to compare the performance techniques of domestic athletes with the foreign elite athletes. The students can greatly benefit by this comparison and analysis. The videos also enable to obtain technical movements of each student to further analyze and suggest remedial actions. The gaps in their learning could be identified and timely corrections could be made. Therefore, from the point of view of cultivating interest in learning and teaching, multimedia teaching mode has an absolute advantage.

Table 1.

*Survey of students' attitudes towards learning after the experimental group n=30*

Serial number	Questionnaire question	A	B	C	D
1	The degree of love for multimedia teaching	0.524	0.417	0.042	0
2	The impact of multimedia teaching on learning interest	0.625	0.250	0.125	0
3	Attitudes to adopt other teaching in multimedia teaching	0.458	0.417	0.125	0
4	The impact of multimedia teaching on teaching ability	0.250	0.625	0.125	0
5	The impact of multimedia teaching on the classroom atmosphere	0.375	0.458	0.167	0

6	The impact of multimedia teaching on classroom student relations	0.375	0.417	0.208	0
7	The impact of multimedia teaching on classroom teacher-student relationship	0.833	0.125	0.042	0
8	Willing to help students practice	0.500	0.417	0.042	0.042
9	Teaching effect of classroom teaching and demonstration	0.208	0.417	0.292	0.083
10	Attitudes towards teachers and classmates	0.333	0.583	0.083	0
11	The impact of multimedia teaching on future teaching internships	0.708	0.250	0.042	0
12	The impact of multimedia teaching on data collection and writing skills	0.375	0.500	0.125	0
13	The impact of multimedia teaching on mastery of technical skills	0.417	0.417	0.167	0
14	Attitudes towards the evaluation of multimedia teaching	0.542	0.417	0.042	0
15	After-school study and actual exercise exercises	0.417	0.333	0.208	0

### **Sports - Long Jump**

#### ***Comparative analysis of the results of long jump technical evaluation of experimental group and control group***

This section presents the core content of long jump technical evaluation. This evaluation after the completion of technical movements in long jump sport was undoubtedly an essential

Table 2.

Comparative analysis of the scores of the long jump technical evaluation of the experimental group and the control group (n=60)

Grade type	Initial evaluation score		Evaluation results	
Group	Control group	Experimental group	Control group	Experimental group
Number of participants	30	30	30	30
Average	63.6	63.3	87.39	76.35
T	-1.141	<0.05	-2.21	<0.05
P				

The statistical data in Table 2 present the initial scores of the two groups of students. The performance of each group was basically the same before the teaching experiment and there was no difference. After the end of the teaching experiment, the long-term performance of the experimental group was found better than that of the control group. The technical evaluation scores passed the T-test. It was statistically significant,  $P < 0.05$ . It was thus found that the long-term results of the control group and the experimental group had obvious results difference. The technical evaluation data of the experimental group was superior to that of the control group. It was evident from the results that the experimental group students who had been

part of teaching. In the 12 hours of course teaching, the teacher used the last class to evaluate students' long jump skills. The evaluation included two parts: theoretical knowledge assessment and essential action completion. Each part carried a score of 50 points and the total score was taken as student's technical evaluation results. Table 2 presents the performance data of students in the relevant technical actions of the experimental group and the control group in long jump sport:

given the multimedia teaching expressed more intricate details in their movement techniques during the long jump project. Simultaneously, it was also seen that this experiment helped students to combine their theoretical knowledge with practical application. Such an integration of theory and practice enabled them to learn long jump technical action in a more standardized manner.

In the control group, the pattern of rote learning undoubtedly revealed action defects, and the performance evaluation of long jump technology resulted in relatively low scores.

***Comparative analysis of students' interest in the long jump in the experimental group and control group***

This section shows the extent to which students were interested in learning long jump sport and how significant was the impact

of the multimedia learning model on student interest and their performance. The statistical data in Table 3 verifies this impact of the multimedia learning model on students' interest, as revealed from the data of the questionnaire:

Table 3.

*Comparative analysis of long-jump learning interest of students in the experimental group and control group n=60*

	Control group		Experimental group	
	n	%	N	%
Very Interested	23	38.3	21	35.0
Generally Interested	19	31.7	14	23.3
Interested	18	30.0	25	41.7
Not Interested	0	0	0	0

Table 3 illustrates that, after the experimental teaching, more than 70% of students in the experimental group were interested in long-jump learning; while only 50% of students in the control group were interested in learning long-jump. It shows that the experimental group students' interest in the long-distance sports program is significantly higher than that of the control group. The long jump project has relatively high requirements of learning technical movements. Students should learn under the teachers' active guidance and show a festive learning spirit. The effective combination of the two sides can effectively improve the learning outcomes. The control group students who were taught through the traditional teaching mode were passive learning subjects, lacking corresponding interaction and learning experience. Hence, it was difficult to cultivate learning interest in these students. It also resulted in a lack of initiative for learning. The experimental group students, on the other hand, were seen taking initiatives and using their multimedia teaching and learning methods to watch their own technical action videos and correcting the mistakes. This shows that this group could better choose their own learning paths and degrees, and

improve the subjective initiative of their learning as well as their interest in learning. The teacher's guidance though effectively stimulated their interest in education, which could be seen as evidence of efficiency and effectiveness of teaching.

***Comparative analysis of the ability of the experimental group and the control group to problem solving of long jump***

The analytical ability to solve a problem determines a student's insight of a problem. A student should have the ability to analyze the essence of a problem by the object's appearance. The core of problem analysis ability is not only limited to analyze a problem but also to find out the cause of the problem and have the ability to solve the problem. In the teaching of the long jump project, both the control group and the experimental group need to have problem analysis ability. Table 4 presents the teacher's final evaluation and opinions about students' problems analytical ability in the two groups after putting the respective teaching methods in practice. The content of the problem ability and other aspects were measured as follows:

Table 4.

*Comparative analysis of the knowledge of long-jump and problem-solving ability of experimental group and control group (n=60)*

		Control group		Experimental group	
		n	%	n	%
Analytical problem ability	Excellent	13	43.3	12	40
	Good	15	50.0	15	50.0
	General	2	6.67	3	10.0
Problem-solving ability	Excellent	12	40.0	11	37
	Good	17	56.6	16	53.3
	General	1	3.3	3	10.0

As is revealed in Table 4 data, the experimental group students show better ability to analyze problems than the control group students. In the experimental group, more than 90% of students could identify problems and solve problems. In contrast, the control group students were relatively low because, in the multimedia teaching mode, the experimental group students spent more time on video viewing, analyzing complex problems, and discussions with the teacher. The guiding and auxiliary functions were more prominent in the experimental group, which can better stimulate students' analytical motivation.

The students in the control group, on the other hand, because of the traditional rote-learning teaching method, show weaker problem analytical ability than the experimental group. The reason is that during the process of learning, the teacher often shares with students the answers to the problems in advance, which reduces the need and desire to learn acquiring

Table 5.

*Comparative analysis of long-distance teaching ability of experimental group and control group students n=60*

	Control group	Experimental group	P
Explanation points	84.16	73.56	<0.05
Demonstration points	85.45	74.59	<0.05
Organizational points	88.89	75.65	<0.05

The statistical data in Table 5 depicts specific teaching effects of the two groups evaluated in the second half of the teaching experiment. The assessment results were scored by the respective coaches of the two groups. The students' average score in the experimental group exceeded 83 points, while the average score of the students in the control group was less than 76 points, with  $P < 0.05$  of both groups having a positive statistical significance.

This finding demonstrates that when multimedia teaching mode is adopted, the practical skills of the experimental group students are relatively better than that of the control group. The use of multimedia teaching mode thus helps cultivate students' practical ability, which is also of great significance in students' thinking development. This teaching method also pays more attention to explanation, independent exploration and classroom's self-demonstration. This also results in a good

Table 6.

*Comparison of the physical differences of the experimental subjects*

	Four-line turn back	Standing long jump	Run-up touch
Control group	42.97±3.12	6.24±1.09	212.14±9.74
Experimental group	42.59±3.34	6.56±1.24	215.18±10.75
T	-0.145	0.508	-0.341
P	0.888	0.607	0.661

the analytical skills. The students in the control group only paid attention to the cultivation of their mnemonics, or the memorizing skills which leads to a poor evaluation. Moreover, this data also reveals that the experimental group pays more attention to taking initiative to develop problem analysis ability. Hence their analytical skills to take initiative are better than that of the control group. This effectively indicates which group has the better ability to analyze and solve problems.

***Comparative analysis of the effect of long jump teaching in the experimental group and control group***

Table 5 presents a post –experiment statistical analysis of the comparison of the teaching effects of the experimental group students who adopted the multimedia teaching mode and the control group students who embrace the established traditional teaching model, as follows:

improvement in students' ability speak and ask questions. Multimedia teaching also allows students to experience teachers' daily activities in a specific practical manner, which is also very useful for improving students' practical skills. Moreover, mutual evaluation and mutual discussion among students also contributed to continuous accumulation and enrichment of students' knowledge points.

***Sports - Basketball***

***Differences in personal physical fitness of experimental subjects after the experiment***

Table 6 reveals that, after the experiment, there is positive statistical significance ( $P > 0.05$ ) in the four-line reentry run, the standing long jump, and the running height of the experimental object in basketball sport.

The data also shows that there was no significant difference in the physical quality of the subjects before and after the experiment. The data explains that the use of both multimedia teaching methods and traditional teaching methods in junior high school for basketball teaching can enhance the physical fitness of students.

high school for basketball teaching can enhance the physical fitness of students.

Table 7.

*Comparison table of differences in basketball essential parts of experimental subjects*

	Fixed-point shooting	Dribble over the pole
Control group	3.32±1.49	3.08±1.54
Experimental group	3.54±0.44	3.14±1.51
T	0.718	0.358
P	0.516	0.767

***Differences in personal basketball technology after experimen***

Table 7 reveals the values of experimental subjects' fixed-point shooting and dribble over the pole activities are  $P>0.05$ . The data also shows no significant difference in the essential parts of the basketball sport of the subjects before and after the experiment. This explains that the use of both multimedia teaching methods and traditional teaching methods in junior high school for basketball teaching can develop students' basketball skills.

***Comparative analysis of the differences between the experimental and control groups before and after physical fitness***

Table 8 reveals that the physical quality of the experimental group has improved: the average value of the four-line reentry run increased by 2.23 seconds; the average score of the standing long jump rose by 1.24 points; the average cost of the run-up touch also increased by 2.24 cm.

Table 8.

*Comparison of the differences in physical fitness of the experimental class before and after the experiment*

	Four-line turn back	Standing long jump	Run-up touch
Before the experiment	45.32±3.25	5.32±2.43	212.94±9.25
After the experiment	44.69±2.64	6.56±0.14	213.18±10.75
T	-0.161	-8.921	6.642
P	<0.01	<0.01	<0.01

The data also shows that the multimedia teaching method when applied to basketball teaching can enhance students' physical quality. The physical fitness part  $P<0.01$  indicates that the multimedia teaching method significantly improved the students' physical quality when applied to basketball teaching.

Table 9 depicts the physical fitness of the control class, which also improved: the average of the four-line reentry run increased by 2.11 seconds; the average score of the standing long jump increased by 1 point; the average value of the run-up test increased by 1.18 cm.

Table 9.

*Comparison of the differences in physical fitness of the control class before and after the experiment*

	Four-line turn back	Standing long jump	Run-up touch
Before the experiment	45.68±4.13	5.55±1.14	213.96±9.74
After the experiment	44.57±2.72	6.34±1.59	215.14±4.74
T	-0.041	0.718	-0.541
P	<0.01	<0.01	<0.01

This data is the evidence that the traditional teaching method can also enhance students' physical quality when applied to basketball teaching. The physical fitness part  $P<0.01$

indicates that the traditional teaching method improved the physical quality of students in basketball.

The overall results of the experiment can be summed up as under: First, the multimedia teaching method is novel in form and has an excellent sensory effect, which attracts students' attention and effectively improves their internal driving force. Secondly, multimedia teaching method focuses more on students. It pays attention to the law of physical and mental development of students and differences between individuals. Different teaching methods can be adopted to teach physical education at different stages and levels. Out of them, multimedia teaching methods can achieve information sharing and feedback. Through video feedbacks, students can clearly understand their own learning levels, and make learning more targeted. By sharing information, students encourage learning among themselves and compete to enhance the overall group skills. In summary, the multimedia teaching method has a

Table 10.

*Comparison of the differences in the required part of basketball practicals*

	Fixed-point shooting	Dribble over the pole
Before the experiment	2.62±0.59	2.58±0.56
After the experiment	3.74±2.18	3.24±2.56
T	-2.134	-2.673
P	>0.01	>0.01

The fundamental part of basketball is  $P>0.01$ , which indicates that application of multimedia teaching methods to basketball teaching made no significant effect on improving basketball's required level.

Table 11 shows that after the experiment, both fixed-point shooting and dribbling over the pole improved in the control group as well. The average score of the fixed-point shooting

Table 11.

*Comparison of the fundamental differences of basketball in the control class*

	Fixed-point shooting	Dribble over the pole
Before the experiment	2.80±0.82	2.17±0.76
After the experiment	3.31±1.49	3.28±1.9
T	-3.657	-2.435
P	>0.01	>0.01

The fundamental part of basketball is  $P>0.01$  which indicates that traditional teaching method in basketball

higher effect on the students' physical quality of as compared to the traditional teaching method in the teaching of the basketball sport.

***Comparative analysis of the differences between the experimental and control groups in the required parts of basketball***

Table 10 data reveals that fixed-point shooting and dribbling of the experimental class improved: the average score of fixed-point shooting increased by 0.92 while the average value of dribbling increased by 0.66. This data indicates that multimedia teaching method when applied to basketball training, students can improve many of its techniques.

increased by 0.54 while the average value of dribble increased by 0.38.

teaching has a specific effect on improving the necessary level of students' basketball.

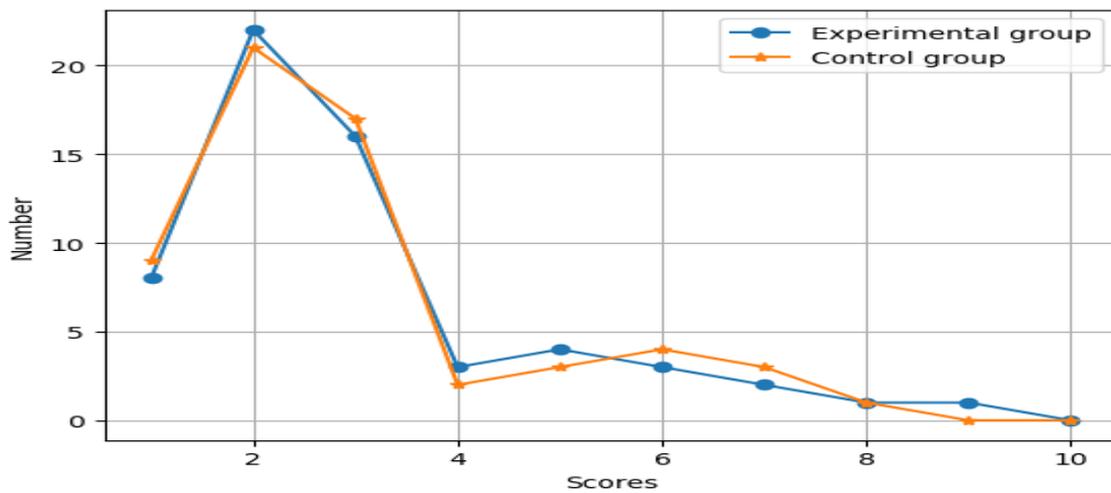


Figure 4. Shooting situation of the experimental class and the control class before the experiment

Based on the following figures (Figure 4 and 5), the results of the fundamental basketball parts of the two classes before and after the experiment were explored. The two figures reveal that the experimental group's fixed-point shooting scores are concentrated in more than four points.

Likewise, Figure 6 and 7 show a trajectory around the pole of the experimental class. After the experiment, there is still

concentration of more than 3 points. This proves that multimedia teaching method has more pronounced effects in improving the necessary level of students' basketball skills. In basketball teaching, multimedia teaching methods thus have advantages over traditional teaching methods.

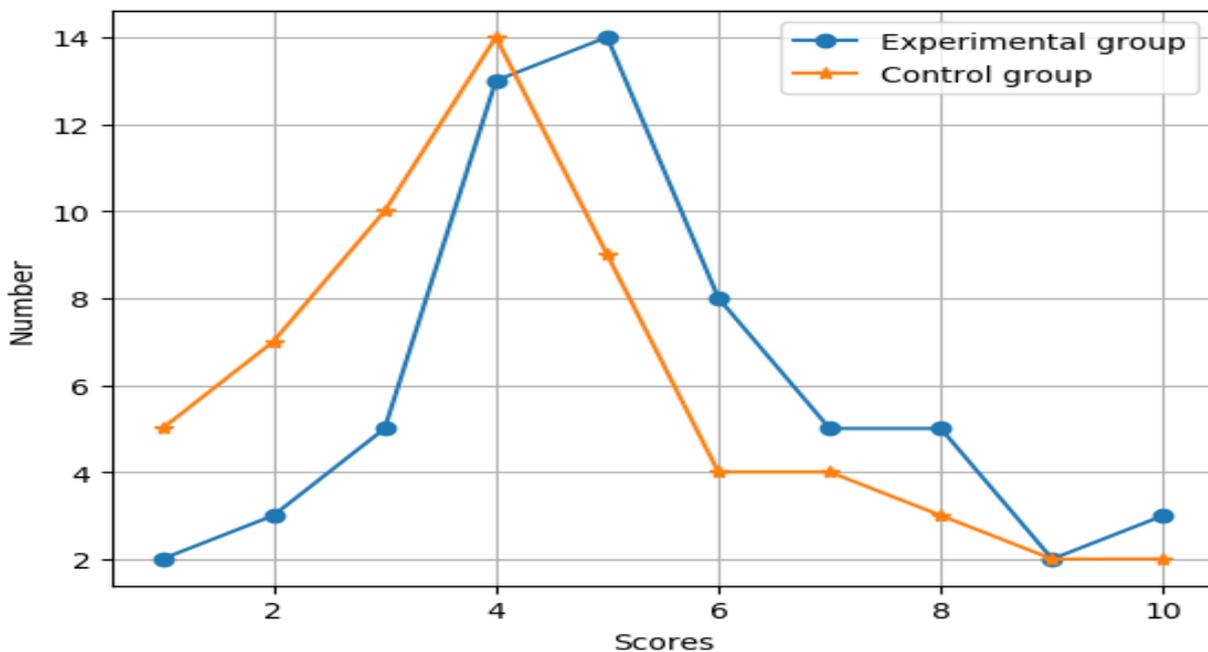
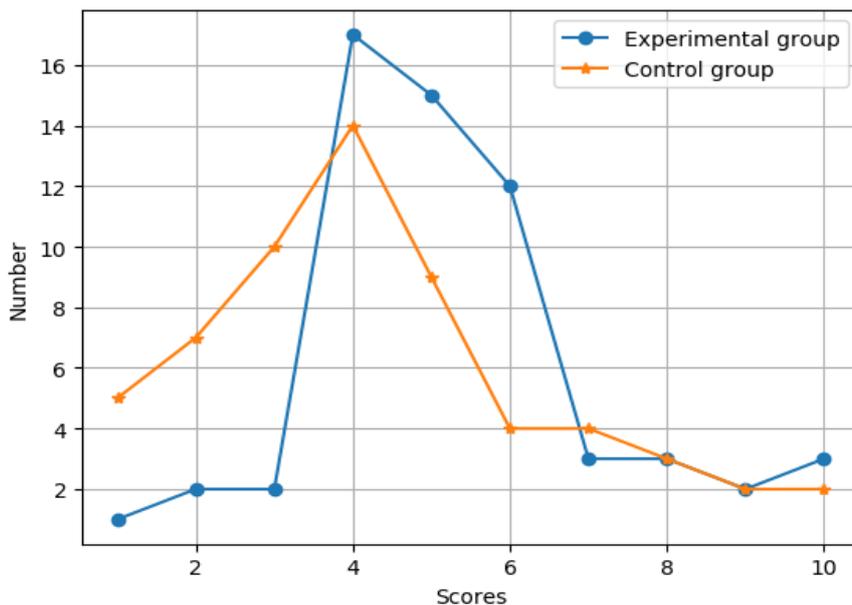
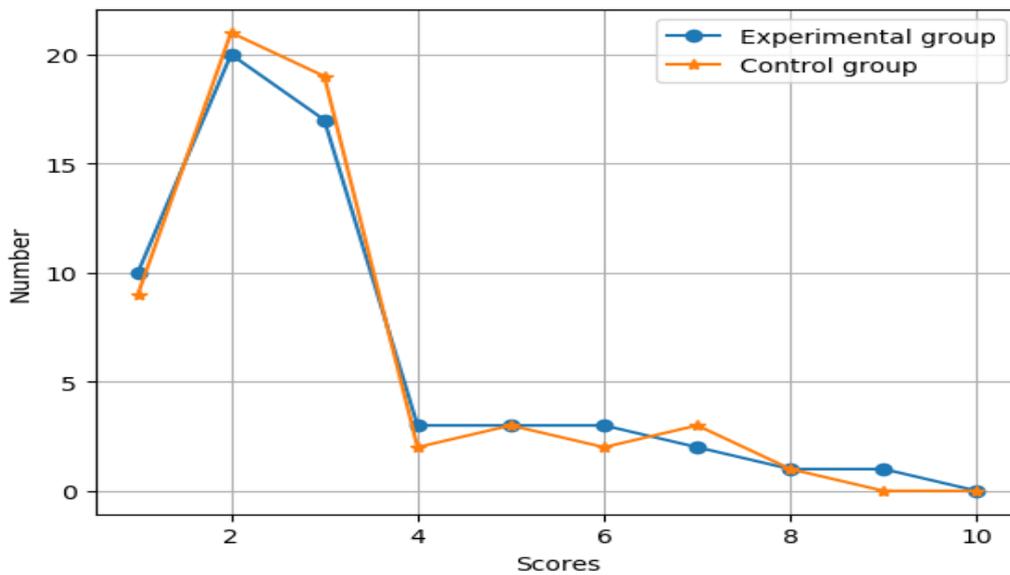


Figure 5. Shooting situation of experimental class and control class after the experiment



**Figure 7.** Dribble situation of the experimental class and the control class after the experiment

There are a few conclusions based on these findings: First, traditional teaching method requires more descriptive explanations than the multimedia teaching method, though for that reason the traditional method cannot have a continuous attraction. In a traditional class, students therefore are often prone to aesthetic fatigue caused by the voice and movement of the physical education teacher. This is also the cause of insufficient driving force in practice of the knowledge that is acquired, which also mars the effect of teaching. Secondly, the feedback about the traditional teaching method reveals that it fails to construct a specific visual image about the game. Their visualization only depends upon the oral expression or

description given by the physical education teacher. The students fail to gain sufficient understanding of the technical movements required in the game. In other words, teachers consume valuable teaching time but cannot achieve the ideal teaching effect. Hence, for these reasons, in basketball teaching, multimedia teaching method improves student's basketball basic level more than the traditional teaching method.

***Analysis of the Advantages of Multimedia Teaching in Physical Education***

- 1) *Conducive to stimulate learning interest*

Multimedia technology centralizes all kinds of information for interpretation, whether it is text, pictures, animation, or videos. It develops good performance ability, allowing students to develop more enthusiasm towards learning. According to the survey results, 56.6% of the students in regular teaching group show interest in learning; 73.3% of these students found this interest due to multimedia teaching. Adequate learning significantly improves students' performance; besides, it is handy for students' work and life. When students have a learning interest, they systematically think about knowledge and also develop the motivation required to learn. Truly speaking, good teaching skills make a significant influence on students' interest. The traditional teaching techniques are therefore mainly to develop students' interest to learn, but gradually the teaching efficiency gets relatively low. However, the results of the experiment also suggest that once students develop the interest in learning, they show more enthusiasm, their concentration gets more concentrated, and the learning effect is significantly improved. Hence, teaching gets more effective with the use of multimedia technology. Students are able to analyze difficulties of knowledge through pictures, and understand the background that needs to be mastered through repeated playback of multimedia and further enhance their interest and enthusiasm. The multimedia technology also allows students to sort out knowledge and understand the critical points of experience. It stimulates students' interest in learning and to better master knowledge. Therefore, it is evident from this study that introduction of multimedia technology dramatically improves students' interest in education and leads to the improvement of overall teaching efficiency as well.

### 2) *Conducive to intuitive teaching*

Theoretically, the traditional physical education depends mainly on the teachers' descriptive explanations. Students are the body of learning and teachers play the guiding role. Students simply accept knowledge, do not form any passion for learning, nor can develop interest in education. It is therefore rather difficult to measure students' actual learning levels. On the other hand, multimedia technology allows students to understand knowledge through sight and hearing, directly subjecting to their intuition. It is much more convenient for teachers to distribute the knowledge domain and let students learn intuitively through text, images, and videos. This kind of learning intervention stimulates students' enthusiasm for learning, creating a better learning environment, and developing excellent ability to grasp difficulties and critical points. Multimedia teaching is therefore a perfect auxiliary tool

for students which can effectively improve teachers' teaching level.

In a multimedia environment, a teacher guides students through PowerPoint courseware. The teaching content that comprise text, pictures, and videos are demonstrated in through slides. These slides are integrated with relevant links to real events and the same could be incorporated or accessed when needed through the Internet. The students have the freedom to search any item of knowledge, connect all knowledge items in tandem, and summarize them to form a sound learning system. The teacher suggests inserting specific pictures and audios into the courseware for developing students' interest and enthusiasm. The multimedia techniques allow students understand sports more intuitively, explore the relevant knowledge with tremendous confidence, and also improve teachers' teaching efficiency. By analyzing the movements of excellent athletes in videos during the experiment, students can recognize the actual situation of relevant skills, find out the problems existing by making a comparative analysis, and improve their athletic skills. To sum up, in-depth application of multimedia technology stimulates students' enthusiasm for learning, helps improve teachers' teaching standard, and it is more intuitive teaching for students.

### 3) *Conducive to breakthrough teaching difficulties*

In any teaching process, there are a few difficulties very vital for students. Teachers do address to these problems through a descriptive explanation during their teaching. The use of multimedia technology in such situations facilitates teachers' analysis of those vital difficulties and dramatically improves their teaching quality. The classroom efficiency level is also improved. The multimedia approach provides the all-around analysis of the vital difficulties and critical points. It enables teachers to deeply analyze the essential items of knowledge about the relevant technical movements of the game. This also gives students the opportunity to combine theory and practice, and learn relevant knowledge more intuitively. The teachers are also able to improve their teaching levels and understand how to analyze vital difficulties raised by students and suggest solutions.

### 4) *Conducive to increasing the amount of teaching information*

Multimedia technology enables teachers to organize the teaching content, optimize data, and design a good knowledge transfer mechanism through a much customized curriculum. The multimedia curriculum comprising pictures and videos is relatively vivid and contains more information as compared to text books that have only words and descriptions. The extensive use of multimedia technology has dramatically improved

teachers' teaching content in the classroom. It provides more knowledge to students in a limited time. After conducting the experimental analysis through multimedia teaching, it is found that most students welcomed multimedia technology as a vital teaching aid. It also changed the traditional teaching model and brought more auditory and visual feelings for students scientifically and efficiently. This has not only improved students' interest in learning but also increased the teaching efficiency of teachers. With the help of powerful audio and video functions laid down in multimedia technology, students develop intuitive understanding, avoid mistakes in their practice, and learn with a more positive attitude. Therefore, our physical education teachers should devote more energy and time to perfect the teaching content of multimedia and promote multimedia teaching through more profound research.

### ***Limitations of multimedia technology in the use of physical education***

#### *1) Site restrictions*

The equipment and gadgets used in teaching through multimedia technology are generally operated indoors, but training and demonstrations in physical education requires outside activities too. For this reason that multimedia teaching is generally indoors, a few outdoor teaching activities are restricted.

#### *2) Lack of hardware facilities*

Multimedia technology requires a lot of hardware such as computers, display monitors, play stations, and Internet. But many primary and secondary schools lack such multimedia hardware in sufficient number and quantity. Many schools do not have even adequate multimedia environment where the configuration with the equipment is really very low. For example, large screen displays on playgrounds, drones, and many more are either missing or of poor quality. Defective equipment affects the classroom teaching. In the absence of the specialized equipment, teachers often use simple pictures to explain technical actions, but it does not help much. It rather adversely affects students' interest in the class and teachers lose the overall classroom impact.

#### *3) Teacher professional knowledge needs to be improved*

With the continuous educational development in China, the use of advanced technology has increased greatly. The operators of these technologies are mostly teachers; hence their quality level determines the implementation of these advanced technologies. To better implement the new education model, teachers therefore need to learn and explore the advanced technologies at a deeper level from theory to practice. Many

teachers are not willing to adapt to multimedia teaching, but it is important that multimedia teaching should become a very crucial teaching model. The hands-on skills and professional knowledge of teachers about multimedia technology therefore needs to be improved.

The teachers' quality level determines the effectiveness of multimedia teaching. Teachers must therefore possess adequate skills of equipment operation, courseware production, and software use. Teachers' efficiency in the use of multimedia proves a breakthrough in all aspects of multimedia technology. They can conduct good technical training only if they are well versed in multimedia teaching from theory to practice. They should be able to use advanced computer technology and networks to obtain relevant information. It is also important for teachers to continually enrich themselves and consolidate the connotation of multimedia teaching to maximize their teaching skills.

## **Conclusion**

With the changing times, science and technology has also made tremendous progress. Computers and networks have become popular in this new era. The development of multimedia technology has played an influential role in promoting education in major universities, especially in the improvement of physical education. But teachers' usual teaching methods are far from being able to adapt to and meet the requirements and challenges of contemporary college physical education. To address this issue, several universities have initiated study reforms in sports teaching and begun to focus on the use of multimedia technology in physical education. Adequate steps are taken to explore new ways to use multimedia technology for physical education and find a new direction in studying physical education in universities. Research studies have also emphasized upon the use of multimedia technology for the development of physical education. Evidences suggest that multimedia technology can stimulate students' interest in learning and is more conducive to students' understanding and mastery of professional knowledge, develop their physical potential, and improve the overall classroom teaching quality.

This study is also one of the research studies on physical education that are voicing new ideas, breaking the old educational concept, and transcending habitual thinking in colleges and universities. This study focus on physical education teaching itself as the research subject, and relates the professional sports teaching with the advanced training and

growth of physical education teachers. The study emphasizes to increase the knowledge about multimedia technology, update the college physical education teaching models, and formulate a scientifically designed physical education teaching model that meets the needs and standards of the present time. This also requires enhancement of the teaching skills of a majority of physical education instructors, who cannot operate multimedia technology with great confidence. To improve teachers' teaching levels, it is important that teachers fully realize the current situation

In multimedia teaching, the choice of media should be carried out from the actual content, and it is necessary to highlight the advantages of multimedia technology so that students can better accept the content. Although multimedia technology has tremendous benefits, its most important benefit is to transmit information to students through pictures, videos, and other types of visualizations. Even if the amount of data is large, the relevant content can be displayed to students intuitively with the help of multimedia technology. Students therefore tend to pay more attention to exciting things.

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Therefore, multimedia technology should be appropriate and depending on the content of the teaching and is in line with the current situation.

To sum up, the process of biological education innovation has undoubtedly changed traditional sports teaching ideas and concepts. However, to meet the needs of new developments, it is necessary to break old innovation. Our physical education teachers should conform to the development of the times and upgrade continuously their professional knowledge and skills of the cutting-edge sports technology. Only by the continued efforts, physical education in colleges and universities can continually innovate and implement new technologies to promote the vigorous development of college sports teaching.

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