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Application of Image and Video Teaching Method in College Physical Education Classroom Multimedia Teaching

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Abstract: *With the development of science and technology, the application of real-time image processing technology has become more and more common and has brought different impacts on life. It occupies a pivotal position in teaching. Meanwhile, contemporary science and technology has played a more significant role in promoting sports. Therefore, the development of competitive sports makes science and technology increasingly become the focus of attention. Meanwhile, the image video teaching method has gradually revealed its unique advantages in sports. This paper probed into the application of image and video teaching method in multimedia teaching of physical education (PE) in colleges and universities, and found that this method has certain application and promotion value. Compared with the traditional method, this method can increase the excellent rate of the students' sports test in the fourth month by 10.3%, and the rate of reaching the standard of sports actions by 10.6%. At the same time, it can also enable students to reduce the time required for course teaching, and improve the teaching efficiency and quality, so as to ultimately improve the overall ability of students. Moreover, the research on the application of image video teaching method can also broaden the application scope of real-time image processing and make it develop better.*

Keywords: *Multimedia Teaching, Image Video Teaching Method, College Sports Class, Visual Significance*

1. Introduction

As the theory of real-time image processing technology is gradually mature, real-time image processing technology has also obtained good development opportunities. However, in the current educational reform and development, teachers' views on education, students, teachers and other aspects have changed greatly. From the reality and the current development status of education and teaching, there are still many problems in the development of education and teaching nowadays. In the daily teaching management, it is still teacher-led, while ignoring the political subjectivity of teachers and students. This is particularly prominent in the traditional PE curriculum. For a long time, in the classroom, students only passively accept the knowledge and skills taught by teachers, which makes it difficult for teachers to receive actual feedback from students. At the same time, it is difficult for teachers to meet the needs of students, which would inevitably lead to poor teaching results and low enthusiasm of college students for sports activities. All this shows the necessity of reforming the current PE classroom teaching mode. Under the current rational allocation of educational resources, how to make students better participate in sports activities is an important issue in current PE in colleges and universities. In this paper, through experiments, it was found that this method can help to improve the students' sports test results and the standardization of sports actions, thus, the quality of classroom teaching can be further improved and the comprehensive quality of students can be cultivated. At the same time, this paper also expected to further improve the real-time image processing theory on this basis, so as to lay the theoretical foundation for further applying it to multimedia.

In order to better study the application of multimedia teaching, many scholars have discussed it from different aspects, and expressed that multimedia teaching is helpful to improve the teaching effect. Fang P E N G studied the optimization of music teaching in colleges and universities based on multimedia technology. He said that the use of multimedia courseware is an ideal modern teaching

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method. Contemporary college students can experience music and art in music appreciation classes, so they can have an understanding of life and the future. Computer multimedia teaching plays an obvious role in optimizing the quality of music teaching in colleges and universities and improving the teaching effect [1]. Vagg Tamara studied multimedia in education. He believes that multimedia technology is an economical and practical teaching method, which can greatly supplement and strengthen traditional teaching methods, improve students' interest in learning and promote teaching results [2]. Rudolph Michelle studied the cognitive theory of multimedia teaching. He said that the field of video teaching has seen the largest growth in multimedia teaching in the past decade. Through experiments, he found that multimedia teaching is the most effective in designing multimedia teaching content. Therefore, when designing teaching courseware, the course text should be close to the teaching video image, so that the teaching effect can be best improved [3]. Amin Md studied the benefits of multimedia teaching in the English classroom. He said that language teachers can better present pictures, audio clips, videos and slides in the language classroom through multimedia teaching. It supports teachers and students to learn language skills, thus improving teaching effectiveness [4]. These scholars' researches on multimedia teaching application can enrich its theoretical content, but there are still some deficiencies.

However, some scholars have also analyzed the multimedia teaching in PE classroom from other angles. Da-Wei Cao focuses on the application of multimedia digital platform in college physical education teaching. It is believed that the reform of multimedia teaching in physical education classroom is imperative, while the multimedia digital platform points out a new direction for the development of university physical education teaching [5]. Kao Chun-Chieh studied the impact of multimedia assisted learning on learning behavior and students' knowledge in PE. He compared the impact of traditional teaching and multimedia teaching on students' learning behavior and knowledge, and showed through experiments that multimedia teaching can improve students' cognition and learning effect [6]. These scholars can provide some theoretical support for the research of multimedia teaching in PE classroom. However, because the research of scholars is limited to multimedia teaching in PE classroom and has not combined it with image and video teaching method, the research method does not keep pace with the times and has no great practical application value. This means that there is still a gap in the research of using real-time image processing technology for multimedia teaching in university physical education classrooms, which needs to be further explored.

This paper focused on the use of image processing techniques in college sports. The experiment showed that this method is feasible. It helps to improve the quality and effect of PE teaching in colleges and universities, and it has certain practical value and practical significance for the reform of PE teaching.

2. Theoretical Exploration on Multimedia Teaching in College PE Classroom

2.1 Current Situation of PE Classroom Teaching in Colleges and Universities

Currently, the dogmatization of teachers and lesson plans, as well as the monotony of the content of book knowledge and the dullness of the teaching format. The creativity and imagination of students are constrained, and the subjectivity of students is not well played, which would directly affect the quality and efficiency of PE teaching. In PE teaching, too much attention is paid to book knowledge and the actual operation of PE is ignored, which is unfavorable to the formation and improvement of students' physical quality, technical level and even spiritual values [7]. In the specific practice of PE teaching, teachers are the main body of teaching, and students' passive acceptance of PE knowledge makes them lose their initiative and enthusiasm for learning. The specific teaching mode of traditional college PE class is shown in Figure 1.

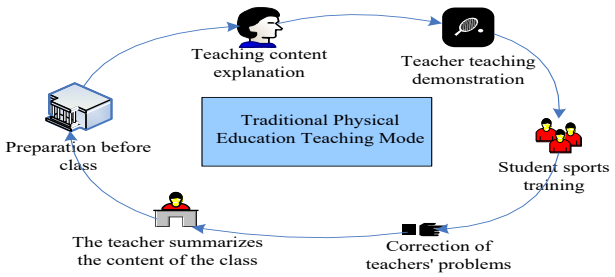

Figure 1: Flow chart of traditional college PE classroom teaching mode

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With the comprehensive reform of the new curriculum and new teaching materials, it has become imperative to improve the teaching level of physical education teachers, so that they can reach the modern level [8]. The traditional physical education model of "passive imitation" can no longer adapt to the new situation of physical education. For this, some scholars have proposed a model based sports teaching method [9]. However, due to the rapid and large capacity spread of multimedia technology, the reform of PE teaching in universities has a lot of room for change, which makes it better improved. It is very feasible to apply multimedia technology to PE teaching in combination with the current teaching staff, software and hardware conditions in colleges and universities. The combination of multimedia technology and information network technology has enriched the teaching content of physical education in colleges and universities. Multimedia technology is an effective means to realize the socialization of physical education. By using multimedia technology to process and produce sports-related electronic audio and video, pictures, etc., the efficient multimedia courseware suitable for PE in colleges and universities can be produced.

2.2 Overview of Multimedia Teaching

2.2.1 Meaning of Multimedia Teaching

Multimedia integrates multiple media. It mainly includes two levels: one is the entity that stores and transmits information; one is the way of information expression or transmission. Multimedia refers to the presentation of various forms of information such as text, images, sound, video and animation in computer form [10]. Multimedia teaching is a technology that can combine text, image, audio, video, and animation. Today's multimedia teaching has gone beyond the traditional meaning of multimedia teaching. It is a process of teaching by using computer and multimedia technology and various multimedia teaching software. It can be used in all aspects of teaching and plays different roles, such as assisting language teaching [11-12]. The current computer software can use graphics, symbols, sounds, images and other forms to express the teaching content, and finally it is presented in the form of projection. Its rich content is far beyond the traditional manual slides. Additionally, the use of multimedia technology can enhance the professionalism of teachers [13]. The important components of the multimedia teaching system are shown in Figure 2.

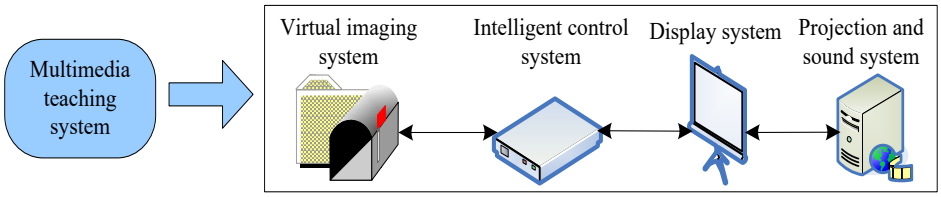

Figure 2: The important structure of multimedia teaching system

2.2.2 Problems in Multimedia Teaching

Whether the teaching objectives are achieved is the only criterion to evaluate the quality of classroom teaching. In order to achieve the best teaching results, appropriate teaching strategies and methods must be used. The multimedia teaching mode is shown in Figure 3.

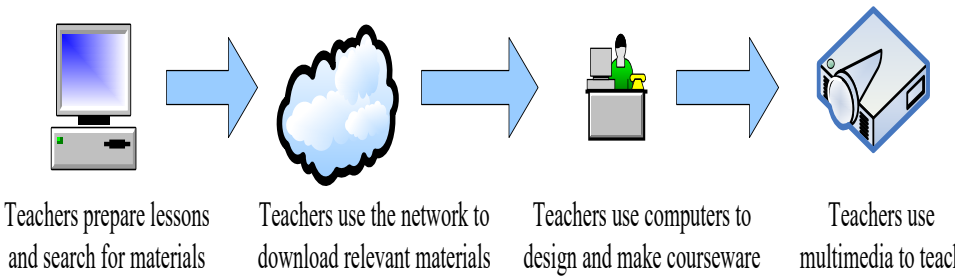

Figure 3: Multimedia teaching mode

The ultimate goal of popularizing and using multimedia teaching in the classroom is to improve teaching effectiveness and teaching quality. To solve this problem effectively, it must be explored in depth and the organic combination of content and form must be realized through reasonable design in order to improve its teaching quality.

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2.2.3 Advantages of Multimedia Teaching in College PE Class

The boring theoretical explanation of sports theory makes students have no patience and interest. Educational psychology believes that students' learning motivation is the most basic motivation, and the interesting teaching methods can stimulate students' learning motivation most. Therefore, in traditional university physical education theory courses, multimedia can be used for classroom teaching.

In the field of sports technology, many sports actions are carried out in sports. Multimedia teaching has specific, visual and intuitive teaching advantages, which makes students have a deeper understanding of sports skills and actions, and helps to form corresponding action images in students' minds. In PE teaching, there are many technical actions that are difficult to understand with language. At the same time, it is difficult for teachers of different ages, different majors and different technical levels to clearly show each link of sports technology. Multimedia teaching not only allows students to clearly understand the technical details of various sports, but also allows them to better emphasize various movement awareness, fixed concepts, as well as key points and difficulties, so as to better master these technical points, promote students' scientific literacy and improve their sports performance [14]. The traditional teaching method is that teachers demonstrate and explain the action essentials, and then students practice repeatedly.

2.2.4 Problems of Multimedia Teaching in College PE Class

In the current PE, multimedia technology has many advantages. However, because the use of multimedia technology in university physical education is still in the exploratory stage, there are still many problems in the actual teaching, which can not fully play its role. On the one hand, the multimedia courseware lacks operability in the aspects of non logic and teacher-student interaction in teaching. On the other hand, multimedia technology can not effectively monitor students' learning, and the realization of multimedia technology advantages depends on students' consciousness and initiative. In PE teaching, it is necessary not only to impart students basic PE knowledge, but also to educate students morally and psychologically. For this reason, image processing techniques were introduced to improve the image quality and make it better for using in PE classes in colleges and universities.

2.3 Image Video Teaching Method

2.3.1 Overview of Image Video Teaching Method

Image video teaching is to show the knowledge and skills taught by the teacher in front of the students in the form of images. In normal teaching, teachers can use electronic equipment in the classroom to store teaching videos on the network in various forms, or store teaching videos on the network in various forms during teaching, or conduct real-time demonstration and interpretation during teaching. In the past, the definition of video teaching was mostly based on the combination of information technology.

2.3.2 Application of Image Video Teaching Method

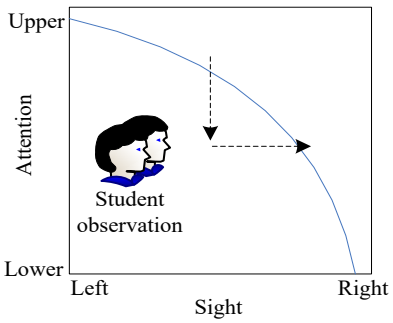

Figure 4: Changes in students' visual flow

The core problem of image and video teaching is image and video processing, and image denoising is the core of image processing. The research found that when students are teaching with images and videos, their vision presents a natural flow state, which has an invisible law, but also has a strong sense of direction. It is an unconscious context and law, and can make the overall movement trend have the main body. Therefore, in classroom video teaching, students' visual flow habits are from left to right, from top to bottom, and their eyes naturally extend along an arc from top to bottom. The lower the line

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of sight, the less attention would be paid. The specific changes of students' visual flow are shown in Figure 4.

In image denoising, in order to effectively obtain high-definition denoising effect, an image denoising algorithm based on visual saliency was proposed [15]. This method is used to determine the significance of image blocks with higher accuracy, and is consistent with the results of BM3D (3D Block Matching Filter). It is a preprocessing method for segmentation of blocks at a single scale, which is more suitable for noise removal optimization of BM3D algorithm.

In this method, the image is visualized. It is divided into blocks of uniform k'k size, and its visual saliency is calculated separately. On a single scale, the spatial distance between two pixels m and n is Euclidean distance. In the color space, the relative dimension probabilities $q(m)$ and $q(n)$ of color are introduced to obtain the color space distance:

$$\mathrm{a_b(m,n)} = \sum\sum \mathrm{q(m)q(n)a_q(m,n)} \tag{1}$$

In the segmented image, the color space distance is also similar. Two different pixel blocks are selected. It is assumed that the number of each pixel is γ_s and γ_d, the color space distance is:

$$\mathrm{A_b(s,d)} = \sum\sum \mathrm{q\,(s)q(d)A_q(s,d)} \tag{2}$$

Among them, $q(s)$ and $q(d)$ represent the probability of opposite dimensions of color; $A_q(s,d)$ is the Euclidean distance.

After that, the contrast of the blocks is calculated:

$$\mathrm{B(s,d)} = \sum_{s=1}^{i_s}\sum_{d=2}^{i_d} \mathrm{A_b(s,d)} \tag{3}$$

The contrast of the image blocks segmented with a single scale can be replaced by the sum of the contrast of other image blocks in the figure. The formula is:

$$\mathrm{B(t)} = \sum_{t\neq s} \vartheta\,(t,s)\mathrm{B(t,s)} \tag{4}$$

Among them, $\vartheta(t,s)$ is the weight function between the current image block and the reference block, which is determined according to the Euclidean distance between the center points of the two image blocks. In this paper, it is defined as:

$$\vartheta(t,s) = \frac{1}{1+a_q(t,s)} \tag{5}$$

In addition to color contrast, spatial location relationship is also an important indicator to measure regional significance. When the distance between two images is closer, the greater the color contrast, and the more attractive the eyes would be. If the distance is far, even if the color contrast is large, it is difficult to attract people's eyes. Under the overall contrast, the saliency of each image block can be expressed by Formula (6):

$$\mathrm{V(t)} = \sum_{t\neq s} e^{-\frac{b(t)}{\theta^2}}\varphi(t)\mathrm{B(t,s)} \tag{6}$$

Among them, $\varphi(t)$ is the area weight parameter, and $B(t,s)$ is the contrast between the current video image block and other blocks; $b(t)$ is the global contrast of the current video image block, and θ is the position space relationship influence factor.

Using this method, the calculation of the significance of the PE course video image block at a single scale can be realized. Then, after the visual saliency calculation, the image blocks with higher saliency are matched by blocks.

The introduction of image and video teaching methods in college PE can enrich the way students learn sports skills. The rapid development of the Internet era makes the application of information technology in physical education more and more extensive, which makes the reform of image and video teaching more acceptable to teachers and students. This has important practical significance for speeding up the teaching process of technical movements and improving the teaching quality.

3. Evaluation of Multimedia Teaching Practice in College PE Class

After analyzing the advantages and disadvantages of multimedia teaching in college PE classroom, the paper also made a theoretical analysis on the feasibility of applying the image video teaching method to it. In order to better verify the practicability of this method, empirical analysis was also

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needed.

3.1 Evaluation Methods of Multimedia Teaching in College PE Classroom

In order to verify the practicability of the application of the image video teaching method in the multimedia teaching of PE in colleges and universities, this paper compared this method with the traditional teaching method, and selected two classes in a local college PE institute as the experimental objects. Class a used the traditional teaching method for PE classroom teaching, and Class b used this image video teaching method for PE classroom teaching. By comparing the overall sports test results of the two classes after four months, the differences in sports action standardization, teaching hours and students' overall abilities were drawn.

3.2 Evaluation of Results of Multimedia Teaching in College PE Classroom

3.2.1 Student Sports Test Results under Two Methods

Students' PE test results are the most direct manifestation of the effect of PE classroom teaching. In this paper, the students of two classes were investigated for their outstanding performance in sports tests every month. The specific results are shown in Figure 5.

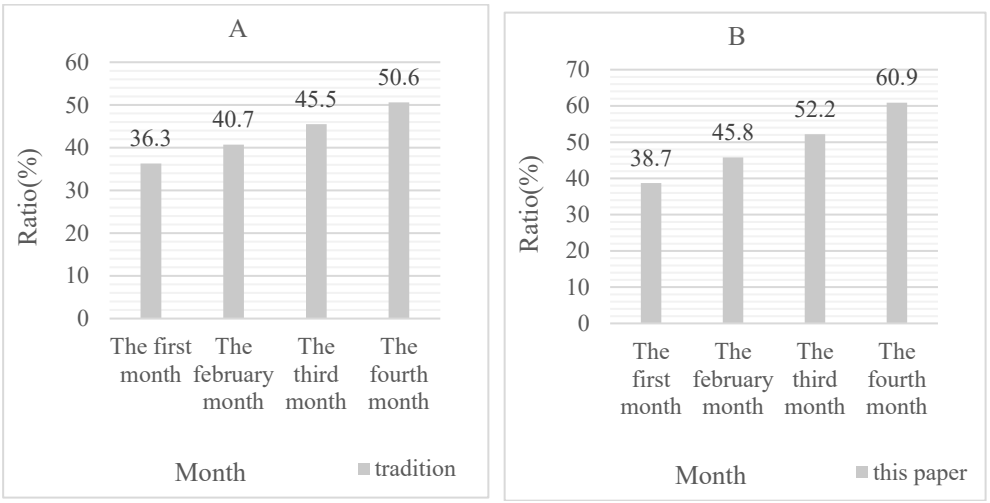

Figure 5: Excellent rate of students' PE test under two methods

Figure 5 (A) shows the excellent rate of students in Class a under the traditional method, and Figure 5 (B) shows the excellent rate of students in Class b under this method.

It can be seen from Figure 5 (A) and Figure 5 (B) that in the first month's sports test, the excellent rate of traditional methods was 36.3%, while that of this method was 38.7%. In the second month, the excellent rate of the traditional method was 40.7%, while that of this method was 45.8%. In the third month, the excellent rate of the traditional method was 45.5%, while that of this method was 52.2%. In the fourth month of the test, the excellent rate of the traditional method was 50.6%, while that of this method was 60.9%. Compared with the traditional method, the excellent rate of sports test in the first month of Class b was 2.4% higher than that of Class a, and 5.1% higher than that of Class a in the second month. In the third month, the excellent rate of Class b was 6.7% higher than that of Class a, and in the fourth month, it was 10.3% higher than that of Class a. It can be seen that the excellent rate of sports test of students in Class b was higher than that of students in Class a. This showed that compared with the traditional teaching methods, the method in this paper is more helpful to improve students' PE test results and make students' PE test reach the excellent standard faster.

3.2.2 Normative Evaluation of Students' Sports Actions under Two Methods

The standardization of sports actions is an important standard to measure students' mastery of sports classroom content. In this paper, the students of the two classes were investigated for reaching the standard of sports action norms within four months. The specific results are shown in Figure 6.

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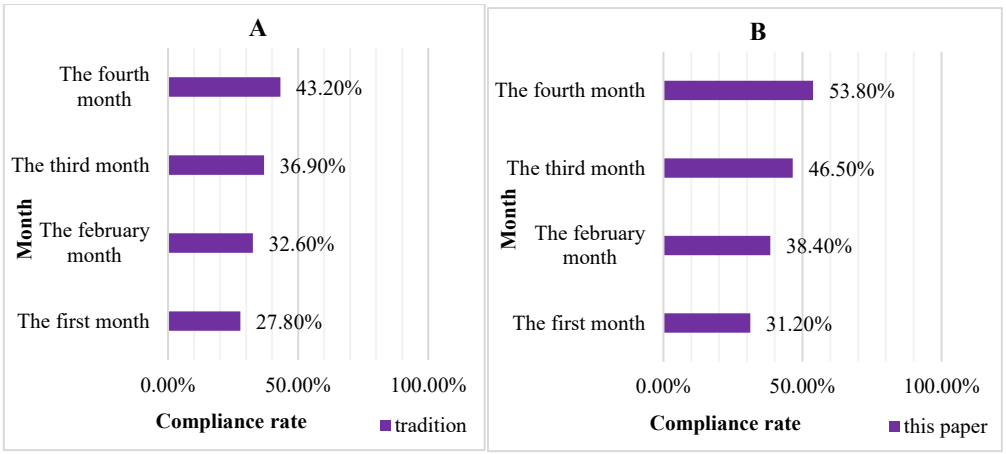

Figure 6: The standard rate of students' sports actions under the two methods

Figure 6 (A) shows the standard reaching rate of sports actions of students in Class a under the traditional method, and Figure 6 (B) shows the standard reaching rate of sports actions of students in Class b under this method.

It can be seen from Figure 6 (A) and Figure 6 (B) that in the first month's standardized test of sports actions, the rate of reaching the standard of students in Class a under the traditional method was 27.8%, while the rate of reaching the standard of students in Class b under this method was 31.2%. Compared with the conventional teaching method, the rate of students meeting the physical activity standards increased by 3.4% in this method. In the fourth month of the test, 43.2% of the students in Class a and 53.8% of the students in Class b reached the standard. Compared to conventional methods, the rate of reaching the standard of students' sports actions under this method increased by 10.6%. It can be seen that this method can not only promote the improvement of students' sports action performance, but also better regulate students' sports actions, so that students can regulate their actions in sports training.

3.2.3 Evaluation of Class Hours Required for Teaching under the Two Methods

There are many kinds of sports events, which require more class hours to teach. This paper compared the time required for college students to master the teaching content of sports courses under the two methods. The specific results are shown in Table 1.

It can be seen from Table 1 that 25 class hours were required for the traditional basketball teaching method, and 19 for the image video teaching method in this paper. The traditional football teaching method required 29 class hours, while the video teaching method in this paper required 24 class hours. The traditional tennis teaching method required 30 class hours, while the video teaching method in this paper required 24 class hours. The traditional teaching method of table tennis required 20 class hours, while the video teaching method in this paper required 16 class hours. Compared with the traditional method, the basketball teaching of this method reduced 6 class hours, and the football teaching reduced 5 class hours; tennis teaching decreased by 6 class hours and table tennis teaching decreased by 4 class hours. Therefore, the method in this article is more conducive to reducing the class hours required for teaching, thus improving the teaching efficiency.

Table 1: The class hours required for college students' PE teaching under the two methods

Serial No	Course type	Required class hours	
		Traditional method	Image video teaching method
1	Basketball	25	19
2	Football	29	24
3	Tennis	30	24
4	Table tennis	20	16

3.2.4 Evaluation of Students' Overall Ability under Two Methods

After analyzing the students' sports test results, the standardization of sports actions, and the class hours required for teaching under the two methods, this paper finally investigated the changes in the students' overall ability under the two methods, which mainly included the students' behavioral ability and cognitive ability. Behavioral ability mainly included students' participation, enthusiasm and attention. Cognitive ability can be divided into understanding, application and cooperation abilities.

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The changes of students' abilities in two aspects after four months are shown in Figure 7.

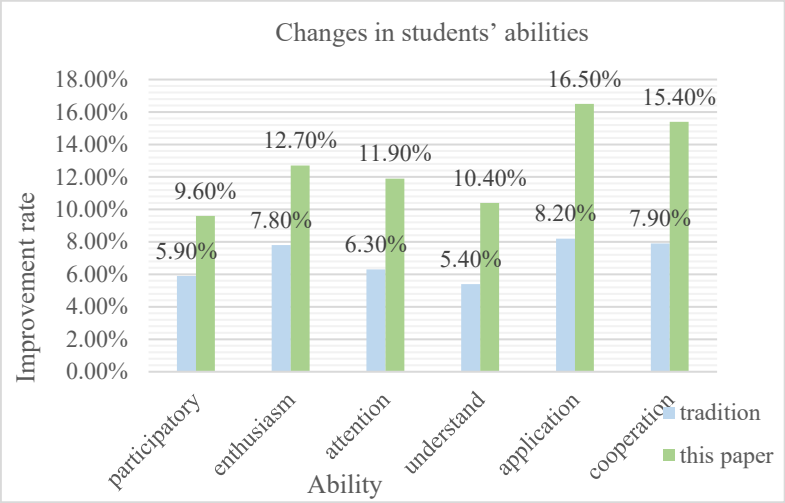

Figure 7: Comparison of students' overall abilities in two ways

It can be seen from Figure 7 that, for the change of behavior ability, compared with the traditional method, the participation, enthusiasm and attention of students in this method were improved by 3.7%, 4.9% and 5.6% respectively. In terms of cognitive ability, compared with the traditional method, the students' understanding ability, application ability and cooperation ability of students in this method were improved 5%, 8.3% and 7.5% respectively. It can be seen that this method can better improve students' ability and ultimately promote students' all-round development.

4. Conclusions

The progress of computer technology makes real-time image processing technology better developed, which makes real-time image processing more and more widely used in daily life. This paper studied the application of image and video teaching method based on real-time image processing technology in college sports classroom multimedia teaching. This paper first gave a brief introduction to the relevant research background, and then summarized the advantages and disadvantages of previous scholars' research. Combined with relevant theoretical research, the current multimedia teaching in college physical education classroom can be improved based on the image video teaching method. In order to prove the feasibility of this idea, this paper also conducted an empirical analysis. The research showed that this method can better improve college students' PE test results, and its action standardization can also be improved. It not only helps to improve the efficiency of classroom teaching, but also can cultivate students' overall ability, which is of practical significance.

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