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Application of 5G Multimedia Virtual Reality Technology in Sports Dance Training

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ABSTRACT Sports dance training involves technical standardization, training efficiency, adaptability to unexpected circumstances, and economic cost. This study investigates the application of 5G multimedia virtual reality technology in sports dance training and compares it with traditional training methods. A virtual training system is constructed through spatial segmentation, body-contour modeling, skeletal extraction, and 3D character modeling. The system captures real-time movement data, compares it with standard action data, and provides immediate feedback for correction. Ten groups comprising 100 sports dance trainees are selected for experimental comparison. Results show that traditional training achieves action-standardization rates ranging from 20% to 56%, with training time decreasing from 200 s to 120 s. By contrast, the 5G multimedia virtual reality training method achieves action-standardization rates ranging from 20% to 96%, with training time decreasing from 200 s to 80 s. Under special circumstances, the virtual reality model also improves attendance stability by reducing spatial constraints. The results indicate that 5G multimedia virtual reality technology improves training standardization, efficiency, flexibility, and accessibility.

INDEX TERMS sports dance training, virtual reality, 5g multimedia, motion capture, training efficiency

I. INTRODUCTION

DANCE as a form of bodily performance art has persisted across centuries. Through the passage of time and historical accumulation, different regions have developed distinct perspectives on dance research. Countries in different regions derive different kinds of dance. At present, there are many kinds of dance, including ballet, classical dance, Latin dance, etc. People's research on dance has also been advancing with the times. In the research of dance field, He, Jing pointed out the development status of dance in phenomenology and cognitive science [1]. Esmail Alida mentioned the benefits and methods of dance training in the journal of body and exercise therapy [2]. You Yuhui mentioned how to conduct training education in dance education research [3]. Raheb Katerina EI pointed out the relationship between the interaction of dance learning and teaching methods in the calculation survey of the American Computer Association [4]. Through the literature review, it was found that there are many kinds of research directions in the field of dance, but few research on training methods.

In the field of dance method research, Munroe-Chandler Krista J has made a detailed discussion and research on the way, method and frequency of sports in Asian sports and sports psychology [5]. Fuller Melanie wrote in an article in the Journal of Dance Medicine and Science about the possible injuries caused by various training methods and gave a clear explanation of training methods [6]. In the Journal of Dance Education, Blevins Peta made a systematic investigation and data analysis on the pressure intensity of dance training methods [7]. Biernacki Jessica L made an in-depth analysis of the possible body injuries caused by ballet dance training in the clinical journal of sports medicine [8]. According to the reference introduction of the above documents, the main research direction in the field of dance methods is still traditional dance training methods, and there is no relevant research on the innovation of training methods.

This paper determines the application of 5G multimedia virtual reality technology to sports dance training as the research direction, and improves the problems and drawbacks of traditional sports dance training through the use of virtual reality technology. The problems and drawbacks include the standard rate of sports dance movements, the efficiency of sports dance learning time, the rate of sudden arrival of classes, and the actual economic cost [9]. This paper introduced a novel innovation in training methods, thereby proposing a new concept in the field of sports dance training methods.

II. APPLICATION METHOD OF 5G MULTIMEDIA VIRTUAL REALITY TECHNOLOGY

5G multimedia virtual reality technology, referred to as VR technology, is used to transmit the data of people in the real world to the virtual cyberspace, and build a 3D virtual character image that can fully reflect the actions of real people in real time. In this paper, the space segmentation method and bone extraction method are used to analyze the data of the body and bones of real people, calculate the data value through the calculation formula, import the data value into the computer system, and then build the 3D virtual human model. The VR equipment and 3D virtual human model are shown in Figure 1:

A. SPACE SEGMENTATION ALGORITHM

By scanning the human body with equipment, people can obtain the basic spatial data of the human body, and obtain a basic body contour model of sports dance trainers. From the lowest point of the model, the cross section of the sports dance trainer's body contour model is cut at every interval of height until the highest point at the top. In this experiment, the number of times to cut the cross section of the body contour model of the sports dance trainer is set to x_1. The cutting process is the intersection of plane Q_c formed by the triangular mesh structure of the computational model and each height function. Because of the closed network structure of the body contour model, the cross section of the body contour model of sports dance trainers would form a closed ring. Therefore, the formulas for calculating the intersection of the height function and the horizontal plane are as follows:

$$a = a_1 + (c - c_1) \times \frac{a_2 - a_1}{c_2 - c_1} \tag{1}$$

$$b = b_1 + (c - c_1) \times \frac{b_2 - b_1}{c_2 - c_1} \tag{2}$$

The three-dimensional coordinate value of the intersection point is (a, b, c) (the value of the intersection point axis c is the section height value), and the three-dimensional coordinate value of the end point of the grid edge where the intersection point is located is (a_1, b_1, c_1) and (a_2, b_2, c_2) respectively. After obtaining the cross section of the level set, the existing cross section of the level set needs to be screened again. The screening criteria are the circularity of the cross section and the area of the cross section. The thresholds of the two standards are calculated by calculating cross sections of different heights, and then the secondary threshold screening is carried out. The roundness of the cross section and the area of the cross section are calculated as follows:

$$V(K) = \frac{1}{2}\sum_{i=0}^{x} NK_h \times NK_{(h+1)\%x} \tag{3}$$

$$P(K) = \frac{4 \times \pi \times V(K)}{Qe(K)^2} \tag{4}$$

Among them, N is any point outside the section; NK_h is the vector formed by the connection between point N and the j point of point set K; $NK_{(h+1)\%x}$ is the vector formed by the connection between point N and the next point of the j point of point set K. $P(K)$ represents the circularity of the cross section composed of point set K; $V(K)$ represents the cross section area composed of point set K; $Qe(K)$ represents the circumference of the cross section composed of point set K. When the cross section is too small, a calculation program is required to calculate whether the cross section meets the requirements and judge whether it is an effective cross section. The threshold value of the cross section is calculated by the calculation formula to determine whether it meets the set threshold value. The threshold value judgment calculation formula is as follows:

$$S = \left[\text{Round}\left(\frac{t_{\text{model}}}{t_{\text{standard}}}\right)\right]^2 \times S_g \tag{5}$$

Among them, t_{model} refers to the height of the model; t_{standard} refers to the height of the standard model (the height selected in this experiment is 170); Round() refers to the arithmetic function of rounding; S_g refers to the threshold value of the cross section calculated by the formula at the height of 170. The threshold standard of the cross section area selected in this experiment is 0.1, and the threshold standard of circularity is 0.2. In this way, a basic body contour model for sports dance trainers can be obtained.

B. BONE EXTRACTION ALGORITHM

On the basis of the physical dance trainer's body contour model constructed by the space segmentation algorithm, the skeleton inside the physical dance trainer's body contour model is constructed. The body contour model of sports dance trainers is divided into five parts, and the geodesic distance from the grid point of the body contour model organization of each part of sports dance trainers to the starting point is calculated respectively, so as to ensure that each bone can still be accurately extracted under the condition of asymmetry of left and right bones. The skeleton extraction algorithm is based on Dijkstra algorithm, that is, Dijkstra algorithm is used to calculate the geodesic distance from all points on the surface of each human body contour tissue to the end point. According to the requirements of each human body contour organization, the number of times for the model to obtain geodesic distance isosurface is set as f, and x is the number of height H_i of the cross section level set. For example, to obtain the maximum geodesic distance of a human body contour model, the maximum value is recorded as $M_{\max}$; the geodesic distance $M_i = M_{\max} \times i/f$ corresponding to the level set C_s of each cross section is determined by the number of cuts f. All the points in this part are ranked according to the geodesic distance of the human body contour model, and the geodesic distance of the first point V is compared with the geodesic distance

FIGURE 1. VR device and 3D virtual character model

M_i corresponding to the geodesic equivalent surface. If M_i is smaller than the geodesic distance, it is $i+1$; if M_i is greater than the geodesic distance, it is regarded as W'. The intersection point between the geodetic isosurface H_i and WW' is calculated, which is a point on the geodetic isosurface H_i. The intersection point formula is as follows:

$$G_{\text{cross}} = \frac{(W' - W)(M_i - M_o)}{M_o' - M_o} + W \tag{6}$$

Among them, M_o and M_o' respectively represent the geodetic distance of grid points, and all points are calculated repeatedly according to the formula until all heights are calculated. The calculation formula of the center point of each geodesic isosurface intersection point is as follows:

$$B = \sum_{u=1}^{s} E_u \tag{7}$$

Among them, E_u is the u point on geodetic isosurface H_i, and the total number of points on geodetic isosurface H_i is s. Through formula operation, all points are calculated to obtain the results, and finally the data of each body contour model part is obtained, which together is the bone structure data of the human body. Through the above two methods, the body contour model data and the bone structure data of sports dance trainers are obtained respectively. Using the computer system processing technology, the two are combined to obtain the 3D character model of the sports dance trainer needed in this experiment. Through the 3D character model of sports dance trainers, the following series of experiments including standard rate of dance movements, dance training efficiency, special circumstances, physical needs, etc. are compared.

III. INVESTIGATION AND COMPARISON OF TRADITIONAL DANCE TEACHING AND VIRTUAL REALITY DANCE TEACHING EXPERIMENT

After obtaining the 3D character model, people can use 5G multimedia virtual reality technology to compare with traditional sports dance training. This experiment mainly compared and analyzed the following traditional sports dance training problems, namely, the standard rate of sports dance movement, the time efficiency of sports dance learning, the attendance rate and the actual economic cost. For this experiment, 10 groups of 10 people were randomly collected. A total of 100 sports dance trainers were used to verify the practicability of the two methods.

A. COMPARISON OF STANDARD RATE OF DANCE MOVEMENTS

Traditional dance training is taught and corrected face to face between teachers and students. Generally, it exists in the form of "one coach and multiple students", which is very important to examine the patience, observation and learning and understanding ability of the coach [10]. In many cases, the students' actions are non-standard and defective, and it is difficult for the instructors as coaches to find out in time. Therefore, the students thought they were right. The coaches did not point out and correct them in time, and the final action was not standard. After using virtual reality technology, coaches can upload their own standard actions to the terminal for processing. When students use virtual reality technology to train sports dance movements, their own movement data would be uploaded to the terminal in real time. The terminal compared the students' action data with the coaches' standard action data. Once the data did not conform, it would give a warning

to the students, so that the students can find errors in time and correct them immediately. The standard rate of traditional training is shown in Table 1, and the standard rate of virtual reality technology training is shown in Table 2:

TABLE 1. Data of traditional training standard rate

Units (%)	First	Second	Third	Fourth	Fifth	Sixth
Group 1	30	15	20	24	27	28
Group 2	10	11	25	20	30	30
Group 3	28	20	10	30	26	36
Group 4	12	6	16	14	16	16
Group 5	24	10	28	26	24	24
Group 6	16	16	12	22	30	22
Group 7	25	8	24	34	38	40
Group 8	15	18	30	18	28	20
Group 9	29	13	15	28	24	26
Group 10	11	13	20	24	27	28
Mean	20	26	40	48	54	56

TABLE 2. Virtual reality training standard rate data

Units (%)	First	Second	Third	Fourth	Fifth	Sixth
Group 1	32	32	46	60	70	98
Group 2	8	28	50	50	60	94
Group 3	20	34	40	40	62	92
Group 4	20	26	44	58	64	100
Group 5	14	36	46	54	76	96
Group 6	26	24	42	62	84	96
Group 7	10	38	44	58	96	94
Group 8	30	22	48	76	98	98
Group 9	24	40	38	66	100	94
Group 10	16	20	42	56	90	96
Mean	20	30	44	58	80	96

It can be seen from the table that the average standard rate of traditional sports dance movement teaching and training was 20%, 26%, 40%, 48%, 54% and 56% respectively, which showed that the traditional teaching method cannot effectively solve the problem of standard rate of movement. In contrast, the average standard rate of sports dance movement teaching and training using virtual reality technology was 20%, 30%, 44%, 58%, 80% and 96%, which greatly improved the issue of the standard rate of movement.

B. COMPARISON OF DANCE TRAINING EFFICIENCY

Traditional dance teaching has existed for a long time, and its single form and long time training would also make people feel boring, which would lead to the decline of the efficiency of dance training. A single training session in this experiment is defined as the completion of a standardized routine consisting of ten fundamental sports dance steps performed consecutively twice without interruption. Boring repetition and long-term physical exertion have always been the chronic disease of sports dance training, and people in the field of sports dance are looking for solutions [11]. With the progress of the times and the development of science and technology, this problem is expected to be solved. By using virtual reality technology, it can bring new training methods to trainers. Because it is a virtual network, people can add many favorite elements in the scene, which makes boring training interesting. At the same time, the new training method also makes the trainers curious, which can make the trainers more involved in training, so as to achieve the purpose of improving training efficiency. The following is the efficiency table generated by two different training methods. The efficiency data of traditional dance training is shown in Table 3, and the efficiency data of virtual reality dance training is shown in Table 4:

TABLE 3. Efficiency data of traditional dance training

Units (second)	First	Second	Third	Fourth	Fifth	Sixth
Group 1	210	190	160	145	140	140
Group 2	220	200	170	150	150	130
Group 3	170	180	165	155	145	120
Group 4	195	175	150	160	135	135
Group 5	215	170	140	140	130	125
Group 6	185	190	160	140	130	115
Group 7	205	185	150	120	125	105
Group 8	230	180	135	125	115	120
Group 9	180	160	130	130	110	110
Group 10	190	170	140	135	120	100
Mean	200	180	150	140	130	120

TABLE 4. Virtual reality dance training efficiency data

Units (second)	First	Second	Third	Fourth	Fifth	Sixth
Group 1	210	190	150	130	120	110
Group 2	220	200	140	120	110	100
Group 3	225	180	130	110	100	90
Group 4	215	170	135	125	90	80
Group 5	200	175	115	115	105	85
Group 6	200	165	145	105	75	75
Group 7	185	170	125	95	90	80
Group 8	175	160	130	110	80	70
Group 9	180	140	120	100	70	60
Group 10	190	150	110	90	60	50
Mean	200	170	130	110	90	80

According to the chart, the average value of traditional dance training efficiency data was 200 seconds, 180 seconds, 150 seconds, 140 seconds, 130 seconds and 120 seconds respectively. This showed that the learning time of traditional dance moves decreased with the increase of learning times, but the downward trend was not obvious, which means that the learning progress of dance moves was very slow under the premise of considering the accuracy rate of actions, and reflected the low learning efficiency from the side. On the contrary, the average data of virtual reality dance training efficiency was 200 seconds, 170 seconds, 130 seconds 110 seconds, 90 seconds and 80 seconds. The obvious downward trend reflected its role in improving the learning efficiency of dance movements.

C. INVESTIGATION ON SPECIAL TEACHING SITUATIONS

In daily life, sports dance training often meets some special circumstances, such as the students' difficulties in teaching from afar, the inability to catch up with the teaching site in case of natural or man-made disasters, and the inability to go out in bad weather. In this case, in the past, people often had to face the shelving of teaching and training, which greatly affected the progress of training [12]. However, after the use of virtual reality technology, both trainees and coaches can no longer worry about the delay of training progress caused by these force majeure. Virtual reality technology can break through the space limitation, and put both parties in the virtual space and get training in the virtual space, fundamentally solving the impact of force majeure. This paper conducted a questionnaire survey on 100 experimental personnel, and obtained the questionnaire survey data on the students' attendance rate of dance trainers in the case of long distance, rain, snow, traffic jams, power outages and epidemics. The traditional attendance rate data were 90%, 80%, 60%, 90%, 100% and 0% respectively. The 100% value for power outages in traditional training represents an idealized scenario not reflective of most dance facilities. The 100% attendance rate for traditional training during a power outage assumes the availability of natural lighting and acoustic instruments without electronic

amplification, a condition rarely met in standard indoor dance studios. The data of virtual reality attendance rate were 100%, 100%, 100%, 100%, 0% and 100% respectively. VR technology retains functionality during a power outage when powered by mobile device batteries, making the attendance rate dependent on the availability of such alternative power sources rather than uniformly zero. It can be seen from the data that the traditional teaching and training would be affected by various objective factors in reality, and most of them were affected by the social objective environment, resulting in inconvenient travel, thus affecting the class attendance rate. However, after using virtual reality technology, people would no longer be affected by natural conditions, and the virtual network world fundamentally excludes natural conditions. Both trainers and teachers can complete learning and communication at home. There are also extreme cases, that is, when there is no electricity. Nowadays, many science and technology products cannot leave the power demand. All science and technology are based on energy. When large-scale power outages occur, virtual reality technology cannot be used.

D. INVESTIGATION OF PHYSICAL DEMAND AND COST

Traditional sports dance, whether teaching or training, has the requirements of venue and clothing. Sometimes, in order to cope with different types of dance, people need to change different clothes. The price of clothing varies from expensive to affordable. However, this expense is a big expense for every family [13]. However, in the face of virtual reality technology, these problems can be readily solved. The economic comparison presented in this study accounts only for clothing expenses. The initial investment in VR hardware including headsets motion trackers and 5G data subscriptions represents a substantial fixed cost that traditional training does not require. A complete economic evaluation incorporates these capital expenditures alongside the variable clothing costs. Virtual reality technology can freely change clothes for 3D virtual character models. In the virtual network world, all things would be transformed into a string of network data. Students can freely change their favorite clothes in the virtual world, and coaches can also avoid the high rent of venues. In this paper, 100 students were divided into ten groups for a questionnaire survey, and the average cost of clothing for each group was 9000 CNY, 18000 CNY, 40000 CNY, 24000 CNY, 6000 CNY, 31000 CNY, 25000 CNY, 19000 CNY, 10000 CNY and 22000 CNY according to the group order under the traditional teaching. Under the virtual reality teaching, the average cost of each group's clothing is 5000 CNY, 5000 CNY, 4000 CNY, 6000 CNY, 6000 CNY, 4000 CNY, 7000 CNY, 5000 CNY, 5000 CNY, 4000 CNY, according to the group order. Through the intuitive understanding of the data, it can be seen that the traditional dance teaching and training mode costs much more in terms of clothing costs, which is a big burden for each trainee's family [14]. The economic strength of each family is different. Some students can afford beautiful performance clothes, while some students can only wear simple training clothes, which also easily causes psychological burden on students, thus affecting learning and training. In contrast, the cost of using virtual reality technology is very stable, and the price is very user-friendly, which can reduce household spending. At the same time, it can also fundamentally cut off the trend of comparison, so that all students have a good learning and training environment for sports dance [15].

IV. EVALUATION OF EXPERIMENTAL DATA OF SPORTS DANCE TRAINING

In the above experimental comparison, this paper compared the four problems in the current sports dance training field through two different methods. It can be seen from the chart that the experimental data of 5G multimedia virtual reality technology was better than the traditional data in any problem, which also intuitively illustrated the development advantages of 5G multimedia virtual reality technology. Next, this paper would conduct an in-depth analysis of the experimental comparison data to fully understand the advantages of 5G multimedia virtual reality technology.

A. COMPARATIVE DATA EVALUATION OF DANCE MOVEMENT STANDARD RATE

According to the table data comparison between traditional dance movements and the standard rate of dance movements using virtual reality technology, a comparison chart of standard rate of dance movements was obtained, as shown in Figure 2:

It can be seen from the comparison chart of the standard rate of dance movements that the experimenters of the two methods were in the same state, with the standard rate of 20%, because they were unfamiliar with each other and the two methods had not yet worked. However, with the increase of dance training times, the standard rate gap of dance moves gradually became obvious. The change in the first four times of dance movement training was not obvious. The standard rate difference of dance moves was only 10%, but it began to change significantly after the fourth time. At the sixth time, the standard rate of dance movements using virtual reality technology reached 96%, while the standard rate of dance movements using traditional teaching was only 56%, with a difference of 40%. This showed that the use of virtual reality technology can greatly improve the standard rate of dance movements of trainers.

B. COMPARATIVE DATA EVALUATION OF DANCE TRAINING EFFICIENCY

According to the table data comparison between traditional dance movements and dance training efficiency using virtual reality technology, a comparison chart of dance training efficiency was obtained, as shown in Figure 3:

It can be seen from the figure that in terms of dance training efficiency, the time cost of virtual reality technology was lower than that of traditional models. In the first three dances, the difference was not obvious. In the third dance training, the virtual reality technology took 130 seconds, while the traditional training took 150 seconds, and the efficiency difference was only 20 seconds. However, after

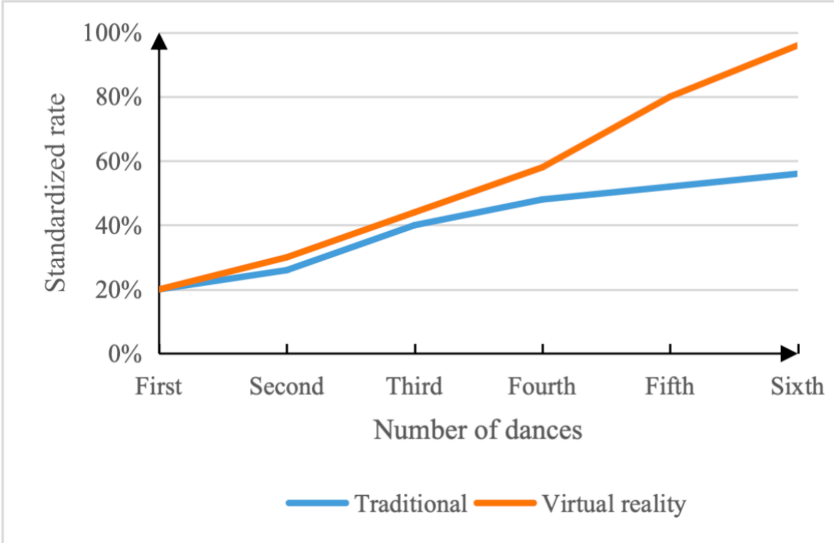

FIGURE 2. Comparison of standard rate of dance movements

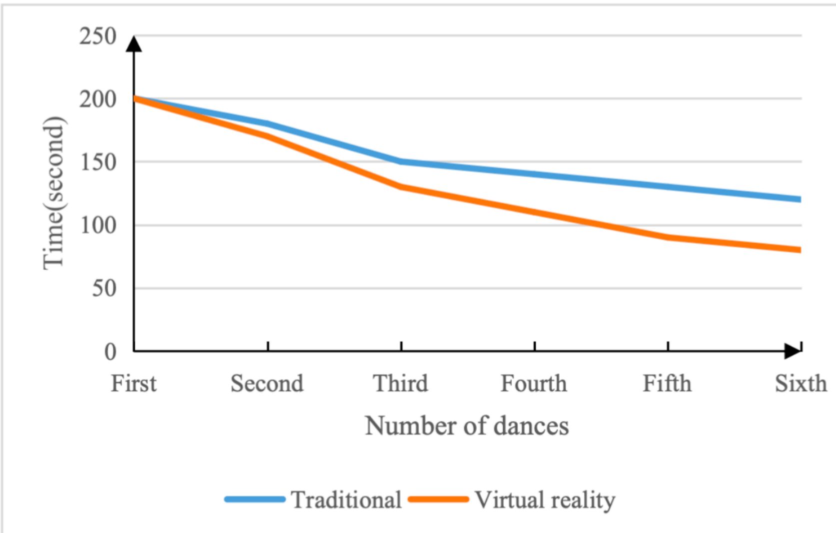

FIGURE 3. Comparison of dance training efficiency

three training adaptation periods, the time efficiency of dance training was gradually increasing. In the last training, the time of the traditional training method was 120 seconds, and the difference was only 80 seconds compared with the first training, with a difference rate of 40%. However, the last dance training using virtual reality technology took 80 seconds, with a difference of 120 seconds compared with the first training, and the difference rate was 60%. Through data comparison, it can be seen that virtual reality technology was more effective than traditional training.

C. COMPARATIVE DATA EVALUATION OF ATTENDANCE RATE OF SPORTS DANCE TRAINING

According to the comparison between the arrival rate of traditional training and the arrival rate of virtual reality training, the comparison chart of training arrival rate is shown in Figure 4:

It can be seen intuitively from the figure that the attendance rate of traditional training would be affected by natural factors. The attendance rate fluctuated under the harsh natural environment, and it was the most serious in the case of epidemics. Considering the personal safety of everyone, the attendance rate was 0%, so people had to cancel the training course, which seriously affected the training progress. However, the attendance rate would not be affected as long as it was not caused by natural conditions. The chart indicates a 100% attendance rate for traditional training during a power outage, which assumes that training continues without electric lighting or amplified music; under realistic indoor studio conditions requiring electricity for illumination and sound equipment, the attendance rate would be substantially lower, which also showed that the traditional

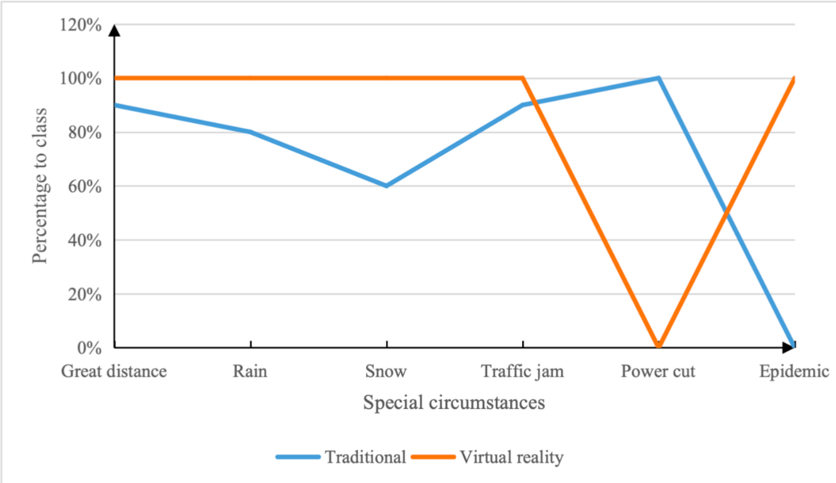

FIGURE 4. Comparison of attendance rate of sports dance training

training attendance rate was greatly affected by weather and other factors. On the contrary, the attendance rate of training with virtual reality technology was 100% under natural conditions. Even if it was an epidemic that affected personal safety, the attendance rate can still reach 100%, which fully showed that virtual reality technology was not affected by natural factors. Virtual reality technology transcended the limitations of natural factors, which was a major breakthrough in the rate of physical dance training to class. However, under specific conditions, there were also drawbacks, because virtual reality technology belonged to modern science and technology, so it cannot leave the energy supply. In case of power failure without alternative power sources such as mobile device batteries, virtual reality technology loses its function and the attendance rate becomes 0%.

D. COMPARATIVE DATA EVALUATION OF SPORTS DANCE TRAINING COSTS

According to the comparison between the economic cost of traditional training and the economic cost of using virtual reality technology, the comparison chart of the economic cost of sports dance training is shown in Figure 5:

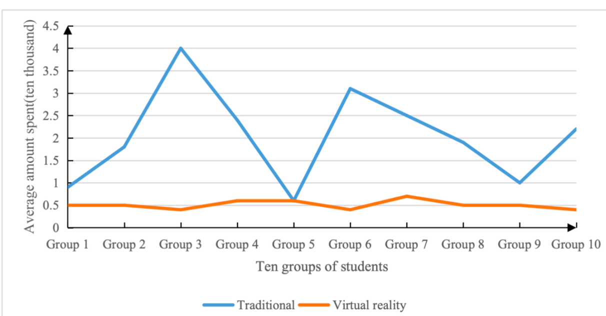

FIGURE 5. Comparison chart of average economic cost of dancing costume

According to the fluctuations in the figure, it can be seen intuitively that the economic cost of traditional dance training applied to real clothing fluctuated greatly, which also indirectly indicated that not every dance trainee's family was very rich. It can be seen from the broken line chart that the average clothing cost of the third group of students was up to 40000 yuan, while the lowest group of students was the fifth group, which was only 6000 yuan. The difference between the clothing cost of the two groups was up to 34000 yuan; the average cost of each group was about 20400 yuan; the average personal cost was about 2000 yuan. In contrast, the fluctuation of the cost of using virtual reality technology appeared to be very gentle, generally stable at about 5000 yuan. It can be seen from the broken line chart that the seventh group had the highest expenditure, with an average expenditure of 7000 yuan, and the third, sixth and tenth groups had the lowest expenditure, with an average expenditure of 4000 yuan. The difference between their clothing expenditure was only 3000 yuan, with an average expenditure of 5100 CNY for each group, and an average personal expenditure of about 510 CNY. It can be seen from the comparative data that regarding clothing expenses alone, the economic cost of using virtual reality technology completely undercut the cost of traditional clothing, which was a breakthrough of great benefit for sports dance trainers.

V. CONCLUSIONS

Through the comparative data and analysis of several groups of experiments, it can be seen that the traditional training methods are inefficient in the standard rate of dance training, with the lowest standard rate of 20% and the highest standard rate of 56%. After six times of training, the standard rate has increased by 36%. The efficiency of dance training is also unsatisfactory. The longest training time is 230 seconds, and the shortest is 120 seconds. After six times of training, the time is shortened by 80 seconds, and the efficiency is increased by 40%. The training method using virtual reality technology has a high efficiency in dance training standards, with the lowest standard rate of

20% and the highest standard rate of 96%. After six times of training, the standard rate has increased by 76%. It also has satisfactory performance in terms of dance training efficiency. The longest training time is 225 seconds, and the shortest training time is 80 seconds. After six times of training, the time consumption is shortened by 120 seconds, and the efficiency is increased by 60%.

5G multimedia virtual reality technology, in the traditional sports dance training and teaching, has overcome the long-standing teaching problems of traditional teaching, surpassed the traditional training and teaching in all aspects, and subverted the traditional training and teaching methods, providing a new development and research direction for sports dance training.

AUTHOR CONTRIBUTIONS

Yang Liu designed, collected and analyzed the data, and drafted the manuscript.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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INFORMED CONSENT

Informed consent was obtained from all subjects and/or their legal guardian(s).

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