



Application of Video Reflection Technology in Sports Dance Teaching

Cao WeiPing¹, and Satha Phongsatha²

¹ Ph.D. Candidate, Graduate School of Business and Advanced Technology Management, Assumption University, Bangkok, Thailand

²Program Director of Ph.D. in Teaching and Technology, Graduate School of Business and Advanced Technology Management, Assumption University, Bangkok, Thailand

¹Email: 277310442@qq.com, ORCID ID: <https://orcid.org/0000-0003-2954-4274>

²Email: sathaphn@au.edu, ORCID ID: <https://orcid.org/0000-0002-7035-4678>

Received 20/08/2023

Revised 27/08/2023

Accepted 30/08/2023

Abstract

Background and Aim: As a new teaching method, the video reflection teaching method has been widely used in sports teaching activities. This study plans to apply the video reflection teaching method to the teaching of sports dance, based on the TAM technology acceptance model, and through literature.

Materials and Methods: In this paper, a quasi-experimental research method is adopted, which is divided into experimental class and control class to test the technical quality of sports dance (TQ) before and after, and a questionnaire is used to investigate the students' perception of using technology. Jamovi software was used for statistical analysis and hypothesis testing.

Results: Through research, the application of video reflection technology in sports dance teaching, postures, foot movements, basic movements, preparation-movement-recovery. Rotations and turns, independent movements-Coordinated movements and dynamic changes have significant teaching effects, with the greatest influence on dynamic changes, rotations, and turns.

Conclusion: Application of video reflection technology in sports dance teaching. It can effectively improve the technical literacy (TQ) of dance movements. Includes posture, foot movements, basic movements, preparation - action - recovery, rotation and turn, independent movement - coordinated movement, and dynamic changes. Notably, the use of video reflection showed particularly significant improvements in rotation and turning, as well as coordination of independent motion and dynamic changes.

Keywords: Video Reflection Technology; Sport Dances; Technical Quality (TQ); Applied Research

Introduction

With the continuous development of modern technology, it has become crucial to utilize modern teaching methods and technologies to enhance classroom teaching. Sports dance, also known as “international standard dance,” combines sports, dance, music, clothing, and art into one discipline. According to N’stase (2012), it is an artistic movement that originated from social activities and involves executing complex movements based on time constraints. Traditional teaching methods in sports dance often rely on verbal feedback from teachers observing students’ movements, and repeated demonstrations are used to guide students in practicing technical dance movements. However, when it comes to dance combinations involving jumps, rotations, and flowing movements, students often struggle to understand the intentions and key points of the teacher. Video recording is commonly used by dancers, offering the advantage of reproducing sound, behavior, physical background, and gaze direction. It allows for the conduct of “contextual research,” which refers to using lived experiences for understanding and reflection (Tochon, 1999). In China, Li Shuangcheng et al. (2001) first proposed the



application of video reflection technology in motor skills learning. They filmed students' movements during motor skill exercises and used video playback functions such as slow-motion, pause, and replay to analyze the technical points and difficulties of dance movements. Through continuous comparison, analysis, reflection, and improvement, incorrect movements are corrected and the technical quality of the movements is enhanced.

This study aims to apply video reflection technology to sports dance teaching and establish a comprehensive practical application model. The quasi-experimental research method will be used to evaluate the pre-test and post-test data of secondary factors influencing the technical quality of dance sports (TQ) and assess the effectiveness of video reflection technology in dance sports teaching. The study also aims to describe the practicality and ease of use of video reflection techniques in learning sports dance.

Objectives of Research

To develop the application model of video reflection technology in sports dance teaching. The video reflection technique was used to measure and evaluate the performance of students' technical quality sub-factors. Describe students' perceived ease of use and practicality with the technology.

Literature Review

The Sports Dance Teaching at The Chinese University

In the 1930s, sport dance entered China in the form of ballroom dance. In the 1990s, Chinese colleges and universities gradually set up sports dance courses. Sun Shuxun (2019) pointed out that sports dance, also known as international standard dance, is a movement in which both men and women cooperate within a certain range of music and rhythm to correctly display and use body techniques and skills, including the ability to control body posture, the ability to express movement power, and the ability to use venue space, which can highlight the texture of dance. And combine artistic expression to complete normative and procedural action items. Dance education in the last century emphasized the perfection of dance performance skills, aiming to improve students' physical development through training, achieve more difficult dance movements, improve dance skills, and achieve perfect performance are the main goals of dance education (Bonbright, 1999; Risner, D., & Stinson, 2010). Risner, D. (2010) pointed out that the role of teachers in the 21st century is not just to teach dance steps, but to consciously guide in a world full of different possibilities. Dance is a means to an end, not an end in itself. Important objectives include training reflective and positive teachers, dancers, or choreographers, as well as supporting personal development in the context of acquiring knowledge and skills in dance techniques and composition.

At present, the common problems in the teaching of dance physical education in Chinese colleges and universities are as follows: the teaching methods and measures of teachers do not adapt to the information technology era in the 21st century.

The application of technology in physical education

Wang, Y., & Zheng developed the use of artificial intelligence for conducting dance instruction to improve students' artistic expression. Palao, J. M., Hastie, P. A., Cruz, P. G., & Ortega, E (2015) used video technology to assist students in physical education teaching. This study was carried out in a school in Australia, and the research results showed that video technology improved students' enthusiasm for participating in class. Helps students to go beyond the understanding of technological replication, helps



students to reduce the feeling of marginalization, and enables them to be more engaged in learning (2015); Casey, A., & Jones, B. (2011) developed a digital labeling application for the teaching of tactical awareness in sports competitions. The case study illustrates how physical education teachers can implement a video analysis application to provide feedback and cultivate students' tactical awareness in games. Lindberg, R., Seo, J., & Laine, T. H. (2016). Developed the running Othello 2 (RO2) exergame, players with smartphones and smart belts, to compete in a board game with enhanced physical and instructional tasks. In the physical task, the game uses inertial sensors and heart rate to detect the player's physical activity, and the results show that using RO2 for physical learning is more effective and students are more engaged in the learning atmosphere. Chen, S., & Xia, Y. (2012) conducted a study on the application of media technology in college physical education by using research methods such as literature review, professor interview, and mathematical statistics, indicating that multimedia technology has a positive impact on college physical education, and pointing out existing problems, such as the connection between multimedia teaching and traditional teaching. They point out that only reasonable cooperation between traditional teaching and multimedia teaching can be realized to enrich multimedia courseware and its effect.

Video Feedback for Educational Use

In sports learning, Ives, (Ives, J. C., Straub, W. F., & Shelley, G. A. 2002) showed that "athletes, coaches, and sports scientists have long used movies and videos of personal and team performance to analyze and improve the performance of technical skills. Video feedback seems to be an effective teaching support model in self-control learning methods (Philip, Christopher, Aiken, & Jeffrey, 2016). Philip et al found that coaches can use video playback to help a novice golfer by providing the learner with information about his or her settings, action form, and coordination to facilitate learner learning of complex motor skills.

In dance, according to (Jones, 2014), "Video feedback can be a powerful tool for literacy and [dance] performance) University dance instructors at Queensland Polytechnic (QUT) Creative Industries in Brisbane Australia found integrating video feedback techniques into dance teaching in 2015 for self-review and peer review to develop student awareness and help students improve the performance of technical and aesthetic skills to facilitate intertwined skill sets such as learners' independence, self-reliance and autonomy.

Student reaction to video shooting

Secor, K. E. (2018) found in her study, titled "Improving Students' Skills through Video-guided Assessments in Dance Classes," that participants' skills did not show improvement throughout the study. However, an analysis of their reflective writing revealed that the majority of students believed that watching themselves dance on film aided in their improvement, despite experiencing feelings of insecurity and doubt. According to Robert Eisenberg, his research suggests that when individuals are presented with challenging or discomfort stimuli, conditions that reward high-effort feelings can reduce aversion to effort, leading to improved physical or cognitive performance and increased tolerance (Nozadi, S. S., Spinrad, T. L., Johnson, S. P., & Eisenberg, N. 2018: 248). This theory implies that the discomfort experience of filming and watching oneself dance may facilitate progress rather than impede it.

According to Doughty, S., & Stevens, J. (2002), some students expressed discomfort and unease when watching videos of themselves dancing. They required significant reassurance and guidance to encourage them to repeatedly review their performances. As mentors, Doughty and Stevens observed



that as students became more accustomed to discussing their practice regularly, they became less reliant on feedback from their mentors and became more capable of self-monitoring their performance. This shift demonstrated an increased self-awareness, which is a crucial prerequisite for the development of autonomous and self-directed learning.

Measurement of the Sports Dance Performance

To adapt to the characteristics of Dancesport competition and improve the fairness, objectivity, and transparency of the results of Dancesport competition, the World Dancesport Federation has formulated the Dancesport 2.1 scoring rules. The four main criteria for movement dance in the version 2.1 scoring rules are Technical quality (TQ) Use of Music (MM) Pair skills (PS) Choreography and Presentation (CP). Chinese scholar Huang Chengcheng took the three sets of dance sports scoring standards issued by WDSF in 1997, 2009, and 2013 as the research object. The research results showed that the scoring content of the version 2.1 scoring system issued in 2013 was more comprehensive, emphasizing the thematic status of movement techniques, and the difficulty scoring structure reflected the diversified application of techniques. Gradually improve the transparency of the scoring criteria of dance sport, improve the objectivity of the scoring, and better fit the evaluation of the IOC, the media, and the public (Sofron, O-A., & Țifrea, C., 2022). Wang Hua summarized the winning rule of competitive Sports Dance through research, and the research results showed that the winning rule of competitive Sports Dance is that physical fitness is the foundation, ballet training is the key, dance Technical quality is the core, music rhythm is the soul, and artistic expression is the highlight (Wang Hua, 2014). According to the skill level and population characteristics of the study subjects, posture, foot movement, basic movement, and Ready-Action-Restore. rotation and turn, independent movement-coordination movement, and dynamic change were selected as the study variables, and the research hypothesis was proposed.

Conceptual Framework

In this study, the video reflection technique was applied to Sports Dance teaching to improve students' posture and foot movement. Basic movements, preparation-action-recovery, rotation and rotation, independent movement-coordinated movement, and dynamic changes, describe students' perceptions of the activity.

The theories and models on which this study is based are Bloom's goal classification and cooperative learning theory, constructivism learning theory, and technology acceptance model.

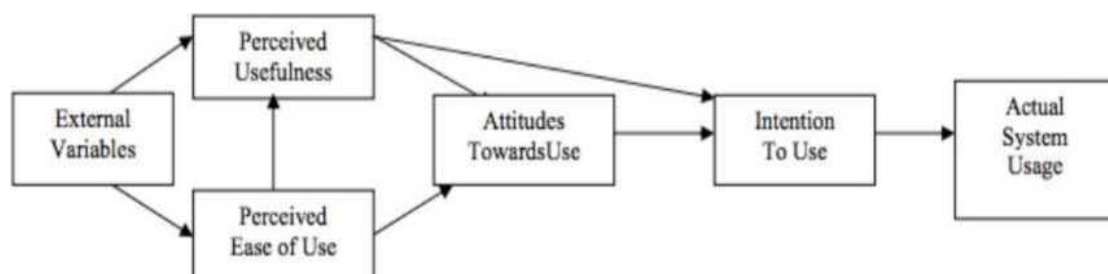


Figure 1: Technology acceptance model

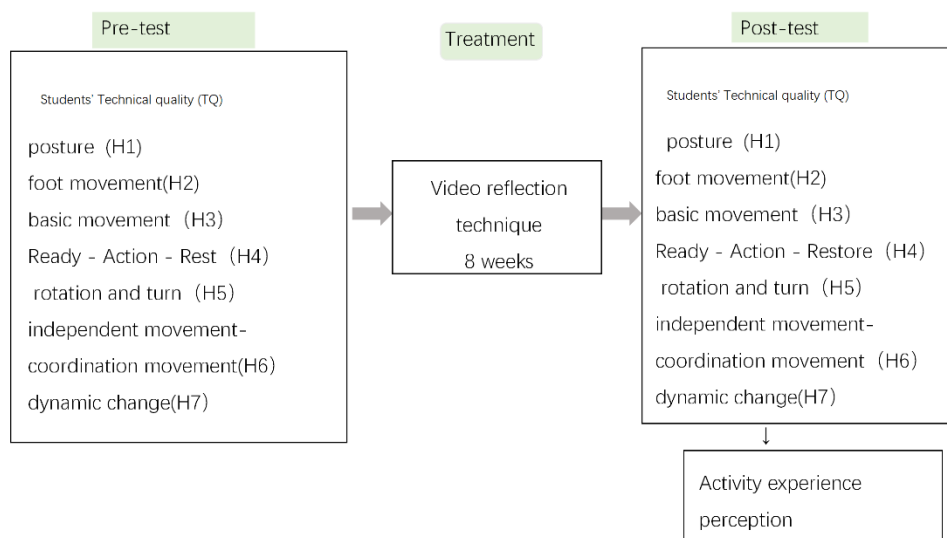


Figure 2: Conceptual Framework

Hypotheses

This study will measure the technical quality (TQ) of students' sports dance from 7 aspects, and define the variables; This leads to the following hypothesis

Posture: The position of the dancer when dancing refers to the dynamic posture, including the position of the body and its various parts in all movements.

H₀1: Video reflection technology was applied to sports dance teaching, but students' posture did not improve.

Ha1: Video reflection technology is applied to sports dance teaching, and students' posture is improved.

Foot movement: The way the feet move and position on the floor, the line and shape of the feet and ankles.

H₀2: Video reflection technology was applied to dance sports teaching, and students' foot movement did not improve.

Ha2: Video reflection technology is applied to sports dance teaching, and students' foot movement is improved.

Basic movement: The ability of basic dance movements is manifested as an extension, bending, rotation, rest, balance, weightlessness, tilt, marching, jumping, shape, and center of gravity shift.

H₀3: Video reflection technology was applied to sports dance teaching, and students' basic movement did not improve.

Ha3: Video reflection technology is applied to sports dance teaching, and students' basic movements are improved.

Ready - Action – Rest: The dancer's ability to initiate, make movements end, and connect with the next movement.

H₀4: Video reflection technology was applied to sports dance teaching, and the students' Ready-Action-Rest did not improve.



Ha4: Video reflection technology is applied to sports dance teaching, and students' Ready-Action-Restore is improved.

Rotation and turn: Ability to rotate continuously, three steps, and other rotational movements. For example, two circles of the spiral turn.

H₀5: Video reflection technology was applied to sports dance teaching, but students' rotation and turn did not improve.

Ha5: Video reflection technology is applied to sports dance teaching, and students' rotation and turn are improved.

Independent movement-coordination movement: Can make independent and associated movements of each part of the body.

H₀6: Video reflection technology was applied to sports dance teaching, and the student's independent movement-coordination movement did not improve.

Ha6: Video reflection technology is applied to sports dance teaching, and students' independent movement-coordination movements are improved.

Dynamic change: A dancer's ability to use weight, time, direction, and energy.

H₀7: Video reflection technology was applied to sports dance teaching, and the students' dynamic change did not improve.

Ha7: Video reflection technology is applied to sports dance teaching, and students' dynamic change is improved.

Methodology

Using quasi-experimental research methods, the main purpose of this study is to answer research questions, measure research variables, and prove or deny research hypotheses. Develop a comprehensive model that applies video reflection technology to dance sport teaching. Compared with traditional teaching methods, use new teaching methods to measure and evaluate students' performance description and summarize students' perceptions and feedback after using video reflection technology. To achieve the research objectives, this study used two sets of design methods to conduct quantitative research on the data. The pre-tests were compared for the students' dance technical quality (TQ) in the process of learning dance sports to see whether the application of video reflection technology in dance sports teaching can improve the students' dance technical quality (TQ). This research compares the students who learn dance skills using video reflection technology teaching methods with those who learn dance skills using traditional teaching methods. The tested assessment tools and related classroom activities help Dance education promote growth and technology development, and use video technology in a relevant and constructive way.

Population and sample size: The population is the sophomore of the dance sport program in the School of Physical Education of a Public university in Sichuan, China. The students at this stage are over 18 years old and have the ability of independent thinking and independent learning. Before entering the university, these students were trained in professional and systematic basic sports projects and were admitted to the university through the examination of sports quality and cultural knowledge. They have good physical quality and cultural literacy. After a year of special study in dance sport, they have basic skills in dance sport. Ability to demonstrate dance skills during research implementation. Every college student in China is equipped with a smartphone, and they can operate the phone proficiently. The researchers used purposeful sampling techniques to find the same characteristics in the crowd according



to the characteristics of the dance sport.

Sampling Method: The sample group comprised 100 students with fundamental dance skills out of a total of 150 students enrolled at a public university in Sichuan Province. These students actively participated in a year-long sports dance course offered by the institution. They were selected through purposeful sampling, aiming to choose specific units from the entire population for study. The fundamental requirement is to ensure that the selected sample units are fully representative of all samples. In this study, 100 students were randomly assigned to either a control group or an experimental group, with 50 individuals in each group. Before implementing video reflection technology for dance physical activities, experts were invited by the researchers to assess the dance technical literacy (TQ) of both student groups.

Research Instrument: The tool used in this study was performance tests (pre/post-test) and questionnaires were used as research tools. The teaching materials used by the researchers are dance and physical education textbooks published by Beijing Sport University Press. The teaching content is the basic elements of Rumba dance and the intermediate combination of competition. Dance skills evaluated by students according to the World Federation of Dance Sports 2.1 rating System posture, foot movement, basic movement, Ready - Action - Restore. rotation and turn, independent movement-coordination movement, and dynamic change 7 elements, Students use mobile phones to shoot videos - watch videos - analyze movements - reflect on summaries - repeat exercises such as a process, and change the technical quality of students' dance movement sub-elements to improve the level of students' dance movement.

The Validity of Research Instruments

The reliability of the instrument: Experts were invited to score the validity of the questionnaire. The content validity test was conducted on 3 experts with at least 10 years of teaching experience in the field of sports by using the project goal consistency index (IOC). The test results showed that the validity of each question of the questionnaire was 1, indicating good validity. Pilot research was conducted on 30 students to assess the reliability of the test for motor skills in dance sports, using Cronbach's coefficient alpha. The results are as follows:

Table 1: Cronbach's coefficient alpha is employed in this study

Item	Cronbach's coefficient alpha is employed in this study
TQ/SC1	0.93
TQ/SC2	0.92
TQ/SC3	0.83
TQ/SC4	0.79
TQ/SC5	0.8
TQ/SC6	0.78
TQ/SC7	0.9

Data Collection and Analysis: Before the experiment, the researchers performed postures, foot movements, basic movements, and ready-to-action recovery in both classes. Spins and turns, autonomous movements-coordinated movements, and dynamic changes, followed by 8 weeks of experimental teaching. Post-test the posture, foot movements, basic movements, and readiness-action recovery of the two classes. Rotation and turn, posture, foot movements, basic movements, Ready-



action-recovery. Rotation and rotation, independent movements-coordinate movements and dynamic changes, and conduct perceived usefulness and ease of use questionnaire for students in the experimental class, obtaining test and questionnaire data. Descriptive statistics were used for data analysis, and paired sample T-test and independent sample T-test were used for hypothesis testing.

Results

Demographic Information

The participants included 100 second-year students from the Physical Education Institute of a public university in Sichuan, China. They were randomly divided into experimental group A (50 students) and control group B (50 students). All participants underwent a test that assessed seven skill indicators of sport dance technical quality (TQ). The participants were mainly aged between 20 and 21. In the experimental group, there were 28 female students, accounting for 55.93%, and 22 male students, accounting for 44.07%. There were 27 female patients in the control group, accounting for 55.70%; There were 23 male cases, accounting for 44.30%. Among the students in the experimental group, 88.14% of the students have used mobile phones for more than two years, and 65.68% of the students often use mobile phones for study.

Table 2: Descriptive Statistics for Treatment Class

Descriptives	N	Mean	Median	SD	SE
posture1	50	6.96	7	0.88	0.124
posture2	50	7.82	8	1.119	0.158
foot movement1	50	6.82	7	0.941	0.133
foot movement2	50	7.88	8	1.003	0.142
basic movement1	50	7	7	1.01	0.143
basic movement2	50	8	8	0.904	0.128
Ready - Action - Restore1	50	6.5	6.5	0.995	0.141
Ready - Action - Restore2	50	7.72	7.5	0.97	0.137
rotation and turn1	50	6.44	6	0.993	0.14
rotation and turn2	50	7.94	8	0.935	0.132
independent movement-coordination movemen1	50	6.64	7	0.898	0.127
independent movement-coordination movemen2	50	8.18	8	0.941	0.133
dynamic change 1	50	6.84	7	1.017	0.144
dynamic change 2	50	8.52	9	0.931	0.132

The participants in the measurement posture category exhibited an average pre-test score of 6.96, which significantly increased to an average post-test score of 7.82. This indicates a notable improvement in the participants' scores about their posture following the intervention.

The measurement items of foot movement yielded an average pre-test score of 6.82, while the



post-test showed an average score of 7.88. These findings indicate a significant increase in scores related to foot movement.

The basic movement measure exhibited an average score of 7.00 in the pre-test, which increased to 8.00 in the post-test, indicating a statistically significant enhancement in the basic movement score. The Ready-Action-Restore measures yielded an average pre-test score of 6.50, which significantly increased to 7.72 in the post-test, indicating a noteworthy enhancement in Ready-Action-Restore achievement.

The rotation and turn measurement exhibited an average pre-test score of 6.44, which substantially improved to 7.94 in the post-test, demonstrating a significant advancement in scoring about rotation and turn.

For the independent movement-coordination movement, the pre-test yielded an average score of 6.64, while the post-test resulted in a significant improvement with an average score of 8.18. The results demonstrate a significant enhancement in the coordination of independent movements. In terms of dynamic change measurement, the pre-test recorded an average score of 6.84, which significantly increased to 8.52 in the post-test. This showed a significant increase in scores for dynamic change as well.

Taken together, the pre-test and post-test scores of these measures showed an improvement trend, indicating that the technical quality (TQ) of participants' dance movements was improved when video reflection technology was applied to dance sports teaching.

Table 3: Descriptive Statistics for Control Class

Descriptives	N	Mean	Median	SD	SE
posture1	50	7.2	7	0.969	0.137
posture2	50	7.54	7	1.216	0.172
foot movement1	50	7.04	7	1.049	0.148
foot movement2	50	7.4	7	1.01	0.143
basic movement1	50	6.6	6	1.143	0.162
basic movement2	50	7.34	7	1.081	0.153
Ready - Action - Restore1	50	6.76	7	0.847	0.12
Ready - Action - Restore2	50	7.14	7	0.948	0.134
rotation and tur1	50	6.96	7	0.925	0.131
rotation and tur2	50	7.28	7	1.07	0.151
independent movement-coordination movemen1	50	7	7	0.969	0.137
independent movement-coordination movemen2	50	7.46	8	0.93	0.132
dynamic change 1	50	7.14	7	1.107	0.157
dynamic change 2	50	7.56	8	1.11	0.157

The posture measurement revealed that participants achieved an average pretest score of 7.20 and an average posttest score of 7.54, indicating a significant improvement in the technical quality of sport dance through the utilization of traditional teaching methods.

The measurement items of foot movement yielded an average pre-test score of 7.04 and an average post-test score of 7.40, indicating a significant improvement in the technical quality of sport



dance through the utilization of traditional teaching methods.

In terms of basic movement measurement, the pre-test yielded an average score of 6.60 while the post-test resulted in an average score of 7.34, indicating a significant improvement in basic movement and technical proficiency in sport dance through traditional teaching methods.

In the Ready-Action-Restore measurement, the average pre-test score was 6.76, while the post-test score showed a notable increase to 7.14, indicating significant advancements in the domain of ready-to-action-restore.

In terms of rotation and turn measurements, there was an improvement observed with an average pre-test score of 6.96 increasing to 7.28 in the post-test, signifying a substantial enhancement in rotational and turn abilities.

In the measurement items of independent movement-coordination movement, the average score on the pre-test was 7.00 and the average score on the post-test was 7.46. This shows a significant improvement in independent movement-coordination movement.

In the dynamic change measurement items, the average score on the pre-test is 7.14 and the average score on the post-test is 7.56. This showed a significant increase in scores for dynamic change as well.

The overall findings indicate an improvement trend in both the pre-test and post-test scores of these measures, as well as an enhancement in the technical quality of dance movements exhibited by participants engaged in traditional practices and teaching methods.

Table 4: Descriptive Statistics for Treatment class and control class

Descriptives	Group	N	Mean	Median	SD	SE
posture	Treatment	50	0.86	1	0.535	0.0756
	Control	50	0.34	0	0.479	0.0677
foot movement	Treatment	50	1.06	1	0.586	0.0829
	Control	50	0.36	0	0.485	0.0686
basic movement	Treatment	50	1	1	0.452	0.0639
	Control	50	0.74	1	0.6	0.0848
Ready-Action-Restore	Treatment	50	1.22	1	0.545	0.0771
	Control	50	0.38	0	0.49	0.0693
rotation and turn	Treatment	50	1.5	2	0.58	0.0821
	Control	50	0.32	0	0.471	0.0666
independent movement-coordination movement	Treatment	50	1.54	2	0.734	0.1038
	Control	50	0.46	0	0.503	0.0712
dynamic change	Treatment	50	1.68	2	0.683	0.0966
	Control	50	0.42	0	0.499	0.0705

The mean score of posture in the treatment group was 0.860, the standard deviation was 0.535, and the difference between the pre-test and post-test was statistically significant. The average score of the same measurement item in the control group was 0.340, and the SD value was 0.479, indicating that there was little difference between the pre-test and post-test.



For the foot movement measurement item, the Treatment group exhibited an average score of 1.060 for the pretest and posterior difference, with a standard deviation (SD) value of 0.586; and the difference between the pre-test and post-test was statistically significant. whereas the Control group showed an average score of 0.360 for the same difference, with an SD value of 0.485. indicating that there was little difference between pre-test and post-test.

For the basic movement measurement item, the average score of the pretest posterior difference of the Treatment group was 1.000, and the value of SD was 0.452; and the difference between the pre-test and post-test was statistically significant. The average score of the pretest and posterior difference of the Control group was 0.740, and the value of SD was 0.600. and the difference between the pre-test and post-test was statistically significant.

For the Ready-Action-Restore measure, the Treatment group had a mean score of 01.220 and SD 0.545 for the pretest and posterior difference, and the difference between the pre-test and post-test was statistically significant. and the Control group had a mean score of 0.380 and SD 0.490 for the pretest and posterior difference. Not much difference.

For the rotation and turn measurement, the treatment group showed a significant pretest and posttest difference of 1.500, with a standard deviation (SD) of 0.580. The control group, on the other hand, had a mean pretest and posttest difference of 0.320, with an SD of 0.471. The difference between the two groups was not significant.

Regarding the independent movement-coordination movement measure, the treatment group had a mean pretest and posttest difference score of 1.540, with an SD of 0.734. The control group had an average pretest and posttest difference score of 0.4600, with an SD of 0.503. The difference between the two groups was not significant.

For dynamic change _imp, the treatment group had a mean pretest and posttest difference score of 1.680, with an SD of 0.683. There was statistical significance in this measurement. The control group had an average pretest and posttest difference score of 0.420, with an SD of 0.499. The difference between the two groups was not significant.

After comprehensive analysis, the average values of the pre-test and post-test in the treatment group were higher than those in the control group, indicating that the application of video reflection technology in the teaching of sports dance (TQ) has a more obvious teaching effect on improving the 7 sub-factors of sports dance quality technology (TQ) than the traditional teaching method.

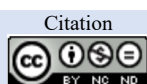
Descriptive Statistics for Survey

To understand how students feel about the usefulness and ease of use of video reflection technology, we conducted a questionnaire survey of students. In the study, the 5 Level Likert Scale questionnaire (Agreement) was employed to collect samples' attitudes toward each variable measured. To interpret the data obtained, the following arbitrary level is utilized to interpret the mean value for each variable (see Table 5).

Table 5: Arbitrary Level for Interpretation of Questionnaire Data

Arbitrary Level	Interpretation
1 – 1.8	Strongly Disagree
1.81 – 2.61	Disagree

[345]



Citation

Cao, W., & Phongsatha, S. (2023). Application of Video Reflection Technology in Sports Dance Teaching. International Journal of Sociologies and Anthropologies Science Reviews (IJSASR), 3 (5), 335-352; DOI: <https://doi.org/10.60027/ijasar.2023.3367>



2.62 – 3.42	Neutral
3.43 – 4.23	Agree
4.24 - 5	Strongly Agree

Table 6: The results of the questionnaire survey

Descriptives	N	Mean	Median	SD	Minimum	Maximum
perceived usefulness	49	3.88	4	0.512	2.67	5
perceived ease of use	49	3.87	3.9	0.412	3.2	5

As can be seen from the table above, the mean of perceived usefulness is 3.88, standard deviation is 0.512. Students generally believe that video reflection technology is useful in learning various techniques of dance sports. Very receptive to the use of video reflection in sports dance classes. the mean of perceived ease of use is 3.87, standard deviation is 0.412. Students generally believe that video reflection technology is fast and convenient to use, and can help them to watch and feedback dance techniques repeatedly. Help them learn the movement techniques of sports dance faster.

Hypothesis Testing

We conducted a hypothesis test with a paired sample T-test to find out whether the experimental group and the control group achieved significant differences in the seven sub-factors of technical quality before and after the experiment. The statistical results are shown in Table 7 and Table 8. As can be seen from the above two tables:

Table 7: Paired Samples t-test result of the experimental group

Paired Samples t-test			Statistic	df	p	M. difference	S.E. difference	Effect Size	
posture1	postur2	Student's	-11.4	49.0	< .001	-0.860	0.0756	Cohen's d	-1.61
Foot movement1	foot movement2	Student's	-12.8	49.0	< .001	-1.060	0.0829	Cohen's d	-1.81
Basic movement1	Basic movement2	Student's	-15.7	49.0	< .001	-1.000	0.0639	Cohen's d	-2.21
Ready - Action - Restore1	Ready - Action - Restore2	Student's	-15.8	49.0	< .001	-1.220	0.0771	Cohen's d	-2.24
rotation and tur1	rotation and tur2	Student's	-18.3	49.0	< .001	-1.500	0.0821	Cohen's d	-2.58
independent movement- coordination movemen1	independent movement- coordination movemen2	Student's	-14.8	49.0	< .001	-1.540	0.1038	Cohen's d	-2.10
dynamic change1	dynamic	Student's	-17.4	49.0	< .001	-1.680	0.0966	Cohen's d	-2.46



Paired Samples t-test	Statistic	df	p	M. difference	S.E. difference	Effect Size
change2						

Table 8: Paired Samples t-test of the controlled group

Paired Samples t-test			Statistic	df	p	M. difference	S.E. difference	Effect Size	
posture1	posture2	Student's t	-5.02	49.0	< .001	-0.340	0.0677	Cohen's d	-0.711
foot movement1	foot	Student's t	-5.25	49.0	< .001	-0.360	0.0686	Cohen's d	-0.742
	movement2								
basic	basic	Student's t	-8.73	49.0	< .001	-0.740	0.0848	Cohen's d	-1.234
movement1	movement2								
Ready-Action- Restore1	Ready - Action - Restore2	Student's t	-5.48	49.0	< .001	-0.380	0.0693	Cohen's d	-0.775
rotation and turn1	rotation and turn2	Student's t	-4.80	49.0	< .001	-0.320	0.0666	Cohen's d	-0.679
independent	independent	Student's t	-6.46	49.0	< .001	-0.460	0.0712	Cohen's d	-0.914
movement-	movement-								
coordination	coordination								
movemen1	movemen2								
dynamic	dynamic	Student's t	-5.96	49.0	< .001	-0.420	0.0705	Cohen's d	-0.842
change1	change2								

There were significant differences (p values less than 0.001) between the pre-test and post-test of class A and class B posture. The size and effect estimate of the mean difference suggests that participants in both groups generally improved their measurements of posture in the post-test phase, with A mean difference of -0.86 in group A versus -0.34 in group B. This suggests that the intervention in Group A may have had a greater impact in terms of posture improvement.

There were significant differences between the pre-test and post-test of foot movement in class A and class B (p values were all less than 0.001). The size and effect estimate of the mean differences suggests that measurements of foot movement generally improved in both groups of participants in the post-test phase, with A mean difference of -1.060 in group A versus -0.360 in group B. This suggests that the intervention in group A may have had a greater impact in improving basic movement.

There were significant differences between the pre-test and post-test of the basic movement of Class A and Class B (p values were all less than 0.001). The size and effect estimate of the mean differences suggests that participants in both groups generally improved their measurements of basic movement in the post-test phase, with A mean difference of -0.100 for group A and -0.740 for group B. This suggests that Group A's intervention may have had a greater impact in terms of basic movement improvement.

There were significant differences between the pre-test and post-test of class A and class B Ready-



Action-Restore (p values were less than 0.001). The size and effect estimate of the mean differences suggests that participants in both groups generally improved their measurements of Ready-Action-Restore in the post-test phase, with A mean difference of -1.220 in group A and -0.380 in group B. This suggests that the intervention in group A may have had a greater impact in terms of ready-to-action-restore improvement.

There were significant differences between the pre-test and post-test of rotation and turn in class A and rotation and turn in class B (p values were less than 0.001). The size and effect estimate of the mean difference suggests that measurements of rotation and turn generally improved for both groups of participants in the post-test phase, with A mean difference of -1.500 for group A and -0.320 for group B. This suggests that the intervention in Group A may have had a greater impact in terms of rotation and turn improvement.

Between the pre-test and post-test of the cooperative movements of class A independent movement-coordination movement and Class B independent movement-coordination movement. There were significant differences (p-values less than 0.001). The size and effect estimate of the mean differences indicates that measurements of independent movement-coordination movement in both groups generally improved in the post-test phase, with A mean difference of -1.540 in group A and -0.460 in group B. This suggests that the intervention of Group A may have had a greater impact on the improvement of the independent movement-coordination movement.

There were significant differences between the pre-test and post-test of dynamic change of class A and class B (p values were all less than 0.001). The size and effect estimate of the mean differences indicates that measurements of dynamic change in both groups of participants generally improved in the post-test phase, with A mean difference of -1.680 in group A and -0.420 in group B. This suggests that the intervention in group A may have had a greater impact in improving dynamic change.

Based on the above data analysis, we can conclude that there are significant differences in the seven sub-elements of the technical quality of class A and class B sport dance sports before and after the test (p values are all less than 0.001), and the size and effect estimate of the mean differences suggest that the measurement results of these seven sub-elements generally improve in the two groups at the post-test stage. The average difference of seven subitems in group A is higher than that in group B, which indicates that the teaching effect of group A may be more significant.

To understand the differences between the experimental group and the control group in seven aspects of technical quality (TQ), an Independent Samples T-Test was conducted on the experimental data of the two groups. The results are shown in Table 9 below.

Table 9 The result of the Independent Samples t-test of the experimental group and controlled group

Experimental group and controlled group		Statistic	df	p	Mean difference	SE difference
posture_imp	Student's t	5.12	98	< .001	0.52	0.101
foot movement_imp	Student's t	6.51	98	< .001	0.7	0.108
basic movement_imp	Student's t	2.45	98	0.016	0.26	0.106



Ready - Action - Restore_imp	Student's t	8.1	98	< .001	0.84	0.104
rotation and turn_imp	Student's t	11.16	98	< .001	1.18	0.106
independent movement- coordination movement_imp	Student's t	8.58	98	< .001	1.08	0.126
dynamic change_imp	Student's t	10.53	98	< .001	1.26	0.12

^a Levene's test is significant ($p < .05$), suggesting a violation of the assumption of equal variances

As can be seen from the table above, for the measurement item posture_imp, after the independent sample T-test, we found that the difference between the Treatment group and the Control group was significant ($t = 5.12$, $df = 98.0$, $p < 0.001$). The mean score of posture_imp in the Treatment group (0.520) was significantly higher than that in the Control group. So reject H0 and accept H1.

For the foot movement_imp measure, the independent sample T-test showed significant differences between the Treatment group and the Control group ($t = 6.51$, $df = 98.0$, $p < 0.001$). The mean score of FM_imp in the Treatment group (0.700) was significantly higher than that in the Control group. So reject H0 and accept H1.

For the basic movement_imp measure, independent sample T-test results showed significant differences between the Treatment and Control groups ($t = 2.45$, $df = 98.0$, $p = 0.016$). In terms of BE_imp, the Treatment group had a slightly higher mean score (0.260) than the Control group. So reject H0 and accept H1.

In the Ready-Action-Restore_imp measure, we found that the difference between the Treatment and Control groups was significant by independent sample T-test ($t = 8.10$, $df = 98.0$, $p < 0.001$). The mean score of EPRM_imp in the Treatment group (0.840) was significantly higher than that in the Control group. So reject H0 and accept H1.

For rotation and turn_imp measures, the independent sample T-test showed significant differences between the Treatment and Control groups ($t = 11.16$, $df = 98.0$, $p < 0.001$). The Treatment group had a significantly higher mean score on rotation and tur_imp (1.180) than the Control group. So reject H0 and accept H1.

For the independent movement coordination movement_imp measurement item, the independent sample T-test results showed that the difference between the Treatment group and the Control group was significant ($t = 8.58$, $df = 98.0$, $p < 0.001$). The mean score of independent movement_imp in the Treatment group (1.080) was significantly higher than that in the Control group. So reject H0 and accept H1.

In the dynamic change_imp measurement item, through an independent sample T-test, we found that the difference between the Treatment group and the Control group was significant ($t = 10.53$, $df = 98.0$, $p < 0.001$). The Treatment group is in dynamic change The average score of dynamic change_imp (1.260) was significantly higher than that of the Control group. So reject H0 and accept H7.

Combining the results, we can conclude that in all measures, the Treatment group scored significantly higher than the Control group, indicating that the Treatment group showed better results on different measures. The dynamic change, rotation, and turn, independent movement-coordination



movement_ of in the treatment group showed the most significant performance improvement.

Discussion

The results demonstrate that the application of video reflection technology in physical education has the potential to enhance the quality of dance techniques. Notably, improvements were observed in all aspects of posture, foot movement, basic movement, original movement recovery, rotation and turn, independent movement, coordinated movement, and dynamic change. The most significant advancements were observed in the areas of rotation and turning, independent motion, coordinated motion, and dynamic change. These findings support the notion that students derive benefits from repeatedly watching, summarizing, and reflecting on videos to enhance their execution of technical dance moves. These findings are consistent with the research conducted by Jones (2014), who concluded that integrating video feedback techniques into dance movement instruction enhances students' self-awareness and fosters improvements in both technical and aesthetic skills. Furthermore, the questionnaire survey results indicate that students provided positive evaluations regarding the usefulness and user-friendliness of the technology. Although some students initially experienced discomfort and nervousness when viewing their videos, this unease served as motivation for them to engage in repeated practice, ultimately enabling them to master the technical moves. Overall, this study supports the proposition put forth by Secor, K. E., and Thunberg that the aversive experience of filming and self-reflection promotes, rather than hinders, skill improvement. These findings offer a meaningful theoretical basis for sports dance educators and advocate for the integration of video reflection technology as a teaching tool in sports dance instruction.

Conclusion

The research findings indicate that video-based reflection technology is a suitable tool for enhancing the teaching method of dance movement technical quality (TQ) and has a positive impact on improving students' dance skills. This technology is particularly effective in addressing the challenges associated with complex dance technical movements. However, it is important to note that video reflection technology should not be the sole teaching tool. In educational practice, teachers should integrate other teaching methods and tools, providing a comprehensive learning experience tailored to the student's characteristics and the content being taught. Furthermore, educators must prioritize the privacy and security of students when using video technology, ensuring responsible use and storage of student video materials.

The deficiency and prospect of research

In this study, researchers and teachers participated in an 8-week sports dance teaching program, without the opportunity to access advanced technology. The evaluation of the sports dance level was based on the scoring criteria of WDSF version 2.1, which considers technical quality (TQ), use of music (MM), coordination skills (PS), and choreography and presentation (CP). This study specifically focuses on whether the application of video reflection technology has a significant impact on the improvement of the technical quality (TQ) of students, while not examining the other three factors. Within the technical quality (TQ) score, there are 12 sub-elements, but due to the skill level of the participating students and the unequal gender ratio, this study only considers 7 sub-factors of the



technical quality of sports dance (TQ). For future research, it would be worthwhile to investigate whether the application of video reflection technology in sports dance teaching has a significant influence on the improvement of the other elements of sports dance.

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