



Analysis of the Current Application of Video Feedback in Sports Teaching and Training

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Abstract. Digital teaching is receiving widespread attention, and video feedback is gradually becoming a new teaching method. This study provides an in-depth analysis of the current status of the application of video feedback in sports teaching and training through methods such as literature review, statistical analysis, and content analysis. It was found that the volume of domestic publications can be divided into three stages, while the international publication volume can be divided into two stages. The studies on video feedback in sports teaching and training, both domestically and internationally, primarily focus on aspects such as teaching offensive and defensive tactical skills, sparring routines and technical movements, and reducing the risk of athlete injuries. It then looks forward to future research in four aspects, including strengthening interdisciplinary cooperation and research, in order to provide a reference basis for more effective application of video feedback to sports teaching and training in the future.

Keywords: Video Feedback; Sports Teaching and Training; Current Situation Analysis

1 Introduction

In recent years, with the development of society and the advancement of technology, digital teaching has attracted increasing attention. Chapter 19 of the "Outline of the National Medium- and Long-Term Educational Reform and Development Plan (2010-2020)" emphasizes the need to "promote the modernization of educational content, teaching methods, and approaches" [1]. The 2023 National Education Work Conference noted the need to "vigorously implement the National Education Digitization Strategy Action"[2]. Compared to traditional sports education methods, video feedback, as an innovative teaching approach, addresses the prevalent issue of neglecting students' central role and interest in sports. Video feedback allows students to observe their technical movements and mistakes during training and instruction, which helps improve their technical skills and fosters a greater interest in sports. Consequently, determining how to systematically and scientifically implement video feedback in sports teaching and training has become a critical issue. This paper

analyzes the literature on the current status of the application of video feedback in sports teaching and training to provide certain reference and theoretical knowledge for future sports teaching and training.

2 Research Methods and Data Sources

2.1 Research Methods

Literature Method. In this paper, through China National Knowledge Infrastructure (CNKI), National Library of Medicine(NLM), Web of Science(WOS) to check the related literature, with "video feedback" as the title, the discipline selection "sports" as the way to search, and summarize and organize the retrieved literature to provide a theoretical basis for the writing of the paper. We search in the way of "video feedback", and summarize and organize the retrieved literature to provide a theoretical basis for the writing of the paper.

Statistical Analysis Method. Based on the retrieved and organized literature, the EXCEL table and the knowledge map analysis of the three major databases are used as the means to reveal the distribution of literature types, the percentage of disciplinary distribution, and the number of annual publications in domestic and foreign-related literature research.

Content Analysis Method.Based on the summarized literature and statistically analyzed data, this paper mines the time evolution process, research hot trends, and issue analysis of video feedback-related research, the distribution of stages and the different dimensions of issue research from different levels.

2.2 Data Sources

The data in this paper mainly come from China National Knowledge Infrastructure (CNKI), National Library of Medicine(NLM), Web of Science(WOS). The specific search methods are as follows:In the CNKI database, using "video feedback" as the title and "Sport Science" as the discipline, 77 Chinese documents were retrieved. In the WoS database, using the same search terms, 27 articles were retrieved. In the NLM database, using "video feedback" as the title and "sport" as the search field, 28 documents were found, with 26 deemed valid. These databases were then used to visualize and analyze the literature.

3 Comparative Analysis of the Evolution of Video Feedback Knowledge at Home and Abroad

Through the China National Knowledge Infrastructure database using "video feedback" as the title retrieved a total of 200 documents. The largest number of

documents, 93 in total, were found in the discipline of "medical education and medical fringe disciplines," followed by 77 documents in the discipline of "sports," accounting for 21.88% of the total. In the Web of Science database, a search with the same title found 285 articles. The discipline of "Education Scientific Disciplines" had the largest number of articles, totaling 48, while "Sport Science" had 27 articles, accounting for 9.47%. In the National Library of Medicine database, 207 articles were found using "video feedback" as the title, with 26 articles related to "sport," accounting for 12.56%.

3.1 Analysis of Time Difference and Knowledge Evolution

The China National Knowledge Infrastructure database shows that the earliest literature titled "Video Feedback" was published in 2005 in the discipline of "Automation Technology," while the earliest literature in the discipline of "Sport Science" was published in 2008. In the Web of Science database, the earliest article in the discipline of "Sport Science" was published in 2010. In the National Library of Medicine database, the earliest sports-related literature dates back to 1971. From a chronological perspective, foreign literature predates domestic literature. Regarding the type of literature, most domestic publications are dissertations, whereas most foreign publications are academic journal articles.

In terms of the number of publications, foreign literature can be categorized into the following two stages: the budding period (1971-2004), and the primary growth period (2012-2024). In the budding period, it was first applied to trampoline learning in the form of videotape in 1971, with the number of publications fluctuating between 0 and 1 for a long time. In the primary growth period, the number of publications increased but remained relatively low, fluctuating between 3 and 5, peaking at 5 in 2016. Domestic literature can be categorized into three phases: the budding period (2008-2011), the primary growth period (2012-2017), and the growth period (2018-2024). During the budding period, video feedback was first used in sports programs in 2008, with 1 article published that year and none in 2009. In the primary growth period, the number of publications increased to 2-4 articles, focusing mostly on the application of video feedback in sports programs. In the growth period, the number of publications increased and surpassed that of foreign literature, reaching 8-11 articles, with 11 articles in 2021. It is predicted that the number of publications will remain at 11 in 2024, according to CNKI.

3.2 Trend Analysis of Research Hotspots

According to the China National Knowledge Infrastructure (CNKI) database, the research hotspots in domestic literature primarily focus on sports such as basketball, tennis, taekwondo, and martial arts. In basketball, the research mainly focuses on teaching shooting techniques, learning technical and tactical skills, basic offensive cooperation, and applications and experiments in university basketball courses. In tennis, the focus is predominantly on teaching serving, forehand and backhand techniques, baseline techniques, and their applications and experiments in university

tennis courses. For taekwondo, the emphasis is mainly on training and competitions. In martial arts, the primary research themes are the teaching experiments and applications of martial arts routines. For other sports, the research generally focuses on experimental and applied studies regarding their teaching and training.

In the National Library of Medicine database and the Web of Science database, the research hotspots in foreign literature primarily focus on the following aspects: In physical education, video feedback is mainly applied to the teaching of technical skills in ball sports and tactical knowledge, such as teaching experiments aimed at improving serve techniques in tennis and tactical knowledge in volleyball. In sports medicine, video feedback is mainly used to reduce injury risks and improve muscle balance in patients with motor impairments. Additionally, video feedback is also used to improve forms of strength training and enhance cognitive aspects in sports science.

4 Analysis of Research Topics on Video Feedback

4.1 Conceptual Analysis of Video Feedback

In domestic literature, the video feedback teaching method is based on feedback teaching theory. It utilizes video equipment to record students' exercises and skill practice sessions, allowing students to watch the recordings, reflect, summarize, and receive feedback to deepen their understanding and application of the skills. Teachers provide timely and accurate guidance based on the feedback, engaging in two-way discussions with students to help them master the movement skills involved in new teaching and training methods [3]. In foreign literature research, video feedback is considered a method that uses edited video clips to promote skill acquisition and improve physiological and psychological responses, thereby achieving better physical performance in competitions. It is regarded as one of the most important strategies before tests or competitions. Additionally, it provides students and athletes with opportunities to recognize their mistakes during training and physical education classes. Video feedback also allows for self-evaluation of the effectiveness of physical performance [4].

4.2 Analysis of the Role of Video Feedback in Physical Education

Education is an educational process that involves imparting and mastering sports knowledge, techniques, and skills. Its main objective is to convey sports knowledge, techniques, and skills through teaching to enhance physical fitness [5]. The emergence of video feedback has effectively aided in achieving the goals of physical education, playing a significant role in the process. Domestic research on video feedback in physical education within domestic literature mainly focuses on the teaching of offensive and defensive tactical abilities, as well as the teaching of sparring routines and technical movements. Most of the literature involves experimental comparative studies in various sports projects.

In the teaching of offensive and defensive tactics, video feedback can help students achieve noticeable results in learning offensive and defensive tactics in ball

sports. In the teaching of offensive and defensive tactics in public basketball courses at universities, through video feedback teaching, students can reap offensive benefits during offensive Tactical movements and better anticipate on-court situations and adjust defensive postures in defensive tactics [6]. In soccer teaching, video replay methods allow students to observe the overall formation changes in soccer matches from different angles, enabling them to more clearly understand the overall changes in soccer formations and form correct movement representations [7].

In the teaching of sparring routines and technical movements, video feedback can help students intuitively perceive the correct sequence of exertion, which aids in improving the standardization of movements. In the teaching of tennis baseline forehand and backhand techniques as well as baseline strokes, video feedback can significantly influence students in mastering the mental representation of the stroke [8]. In taekwondo teaching, students often exhibit issues such as insufficient knee lifts and improper thigh extension during knee lifts, hip turns, and snap kicks. By analyzing videos, students can clearly and intuitively understand the gap between their own techniques and the standard movements [9]. In general aerobics classes, video recordings allow students to watch the videos to correct their mistakes and promote the mastery of technical skills, thus enhancing the teaching effectiveness [10].

In research on physical education abroad, video feedback is more often used as an auxiliary means to improve technical movements, and it is not regarded as a derivative of feedback teaching methods as it is domestically. Additionally, the research subjects are mostly athletes, so there is less research on teaching applications. Existing foreign studies reveal that video feedback can improve the cognition of sports-related knowledge and cultivate the adaptation of long-term memory, thereby enhancing the quality of tactical knowledge [11]. In the teaching of softball, it can improve swinging actions and the ability to make contact with the ball, thus increasing the hitting rate [12]. It also improves the accuracy of swings in golf; research indicates that video feedback is an effective practical tool, but it requires a period of practice to have a positive impact [13].

4.3 Analysis of the Role of Video Feedback in Sports Training and Competitions

Tian Maijiu, in his work, explained sports training as organized and planned physical activities aimed at improving athletes' competitive ability and sports performance [14]. The use of video feedback has positively impacted athletes' competitive ability and performance in sports training and competitions. Video feedback helps athletes analyze and statistically evaluate training and competition videos simultaneously [15], aids in establishing video archives of athletes' technical and tactical skills [16], and sets up real-time observation systems for the evolution of technical and tactical information storage [17].

In domestic literature, research primarily focuses on two dimensions: strengthening athletes' technical movements and sparring routines. In studies on enhancing sparring routines, taekwondo is often the subject, while tennis is primarily

used for improving athletes' technical movements. For instance, in taekwondo training, video feedback can record entire movements, such as rotational movements and backspin, helping promptly identify any gaps and issues during execution [18]. In tennis technical training, a four-week experimental study concluded that video feedback is highly effective in improving the stability of forehand and backhand volleys at the net [19]. In other sports, video feedback also enhances the quality of training. For example, experiments have shown that in table tennis, the experimental group outperformed the control group in backhand push, stroke techniques, and forehand attack techniques [20]. In synchronized swimming, video feedback improves the cognitive ability of swimming techniques, thereby enhancing training efficiency, reducing pre-competition anxiety, and leading to better competition performance [21].

Foreign literature mainly investigates the improvement of athletes' technical and tactical abilities and the reduction of injury risks, with research focusing on rugby, soccer, and volleyball, often involving experimental studies. In studies aimed at improving athletes' technical and tactical abilities, video feedback is used to facilitate self-controlled learning of tactical skills in small-scale soccer games. It helps athletes confirm correct performance elements, identify and correct mistakes, and engage more actively in the learning process [22]. In an experiment testing rugby players' tackling techniques with their dominant and non-dominant shoulders, video feedback was proven effective in optimizing tackling training to enhance player safety and performance [23]. Eight female volleyball players from the Spanish national team participated in an experiment involving watching selected videos, self-reflection, and joint analysis with coaches, demonstrating the effectiveness of video feedback in improving athletes' tactical knowledge [24].

In studies on reducing injury risks for athletes abroad, video feedback serves as a mechanism for rugby players to learn safe tackling behaviors, increasing safety during activities with inherent injury risks [25]. Young female soccer players were instructed on correctly executing movements required to reduce anterior cruciate ligament (ACL) injury risks, with video feedback proving effective in minimizing these risks [26]. In volleyball, a four-week experiment using video feedback led to significant improvements in ankle dorsiflexion, knee and hip flexion, and trunk flexion, enhancing landing techniques among female volleyball players [27].

5 Research Conclusions

1. In terms of time and type of literature, the related research on video feedback first started abroad and is mostly in academic journals, while most of the domestic ones are dissertations. In terms of the number of publications, there are more domestic compared to foreign countries, and the foreign trend can be roughly divided into two phases: the budding period (1971-2004), and the primary growth period (2012-2024); the domestic trend can be roughly divided into three phases: the budding period (2008-2011), primary growth period (2012-2017), and growth period (2018-2024).

2. Current research trends indicate that domestic studies primarily focus on the teaching and training of various sports, with university students as the main subjects.

Foreign research, however, is more diversified; it not only addresses the teaching and training of sports but also includes studies on sports injury prevention.

3. Through the research on the topic of video feedback at home and abroad, it can be found that domestic literature on sports teaching mainly focuses on the teaching of offensive and defensive tactics and the teaching of sparring routines and technical movements. In foreign sports teaching research, video feedback is more used as an auxiliary means to improve technical movements, rather than being regarded as a derivative of feedback teaching methods, as in China.

4. Domestic research in training and competitions mainly focuses on enhancing athletes' technical movements and sparring routines. In contrast, foreign research in training is focused on improving athletes' technical and tactical abilities and reducing the risk of athlete injuries.

6 Conclusion

In the current era, digital education is gaining increasing prominence, making the study of video feedback in teaching and training highly significant. To advance the application of video feedback in sports research, and building on recent trends and topic analyses, this study suggests that future research could focus on four key areas: 1) strengthening interdisciplinary collaboration; 2) conducting long-term tracking and evaluation of teaching and training outcomes; 3) examining the impact of cultural contexts on the use of video feedback in sports teaching and training; and 4) investigating the application of video feedback across different age groups and sports.

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