Technology-Assisted Practice Approach to Enhancing Fixed-Point Shoulder Shooting Accuracy in Basketball

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Abstract

Aim: This study examined the effectiveness of video replay-assisted training in improving the fixed-point shoulder shooting accuracy of female high school basketball players.

Methodology: Twenty girls aged 15–17 from the basketball team of Hohhot No. 8 Middle School participated in a quasi-experimental one-group pretest–posttest design conducted over 20 days. The intervention integrated structured training, video replay, teacher guidance, and student self-analysis.

Results: Before training, most players showed low proficiency and unstable performance. After 20 days, 95% of participants attained a "Good" or higher rating, with 20% reaching "Excellent." Statistical analysis confirmed a significant improvement (t=12.35, p<0.05). Surveys revealed that students perceived video replay as beneficial for accuracy, form, motivation, and confidence, although some challenges in technical understanding and habit change remained.

Conclusion: Video replay-assisted training significantly enhanced basketball shooting skills and provides a cost-effective, replicable approach for integrating technology into physical education, particularly in resource-limited schools.

Keywords: *video replay; basketball instruction; shooting accuracy; female high school students*

Introduction

Basketball has become a vital component of secondary physical education worldwide, promoting not only athletic performance but also discipline, teamwork, and confidence. Among its essential skills, fixed-point shoulder shooting is central to scoring proficiency and overall game success. However, mastery of this skill requires consistent training, immediate feedback, and reinforcement of proper biomechanics (Amaro et al., 2023; Irawan, 2022). In recent years, the integration of digital coaching interventions such as video replay, motion analysis, and augmented feedback has emerged as an effective way to enhance both technical accuracy and learning motivation (Lorenz & Murray, 2022; Stoszkowski & Collins, 2023). Empirical evidence affirms that such approaches not only improve motor execution but also foster reflective practice and long-term learning transfer (Krause et al., 2021; Palao et al., 2022).

In China, however, basketball instruction in many schools remains largely reliant on traditional approaches, with limited application of technology to refine specialized skills. This challenge is particularly evident among female athletes in under-resourced schools, where individualized feedback and structured corrective guidance are often lacking. While national education policies increasingly emphasize the digital transformation of teaching, including in physical education (Zhu, 2023), systematic empirical studies on video replay-assisted basketball instruction for high school girls remain scarce.

This study addresses this gap by examining the effectiveness of video replay-assisted training in improving the fixed-point shoulder shooting accuracy of female high school basketball players. Anchored on motor learning principles, the intervention demonstrates how cost-effective digital tools may be integrated into structured training to support skill mastery, motivation, and reflective practice. Its significance lies in bridging international innovations with local realities, offering a replicable model for resource-limited educational contexts.

Review of Related Literature and Studies

Recent scholarship underscores the transformative impact of technology in sports training and physical education. Studies confirm that video modeling and replay analysis significantly improve motor skill acquisition, execution stability, and technical accuracy in adolescent athletes (Tannoubi et al., 2023; Krause et al., 2021; Palao et al., 2022). Beyond technical improvement, digital tools such as video feedback, virtual simulations, and augmented reality contribute to higher learner engagement, confidence, and reflective awareness (Pérez-Muñoz et al., 2024; Wu et al., 2024). Such findings reinforce the notion that technology-supported instruction promotes not only immediate skill gains but also self-regulated learning, a critical aspect of long-term sports development (Zimmerman, 1990; Wulf & Lewthwaite, 2021).

Research specific to basketball highlights similar benefits. Experimental studies show that digital feedback and biomechanical analysis enhance shooting mechanics, accuracy, and performance consistency across varied practice conditions (Gao & Chen, 2020; Jing, 2023). Complementary studies further emphasize that interventions such as core strength training, balance development, and proprioceptive exercises positively influence shot precision and reliability (Zhu, 2023; Xue, 2024; Hassan, 2025). Collectively, these findings establish that integrating structured training with technological feedback accelerates both motor learning and competitive readiness in basketball players.

In the Chinese educational context, video-based instruction and blended learning strategies have been found to enhance technical skill acquisition, learner autonomy, and engagement, especially among female athletes (Chen, 2023; Lin, 2024). Nevertheless, challenges such as limited access to equipment, uneven teacher preparation, and contextual constraints in underdeveloped schools persist. These realities indicate a gap in the systematic application of video replay interventions in high school girls' basketball training, particularly for fixed-point shoulder shooting. The present study responds to this research gap by empirically testing the effectiveness of technology-assisted training within this setting.

Theoretical and Conceptual Frameworks

This study is grounded in Motor Learning Theory, which posits that skill acquisition is achieved through structured practice, repetition, and augmented feedback (Schmidt & Lee, 2020; Leech et al., 2021). The theory highlights three fundamental dimensions of motor development—accuracy, performance, and consistency—all of which are essential in basketball shooting. Video replay functions as a form of augmented feedback that allows athletes to observe their actions, compare them with correct models, and make targeted adjustments.

Supporting this perspective, Williams and Hodges (2022) emphasize that expertise in sport develops through deliberate practice, immediate feedback, and reflection on performance. Similarly, Stoszkowski and Collins (2023) argue that video-based practice enhances both technical proficiency and metacognitive skills by encouraging athletes to critically evaluate their own movements. In basketball, where precision and reliability are central to scoring, such an approach directly supports the development of shooting skills.

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Figure 1.
Motor Learning Theory
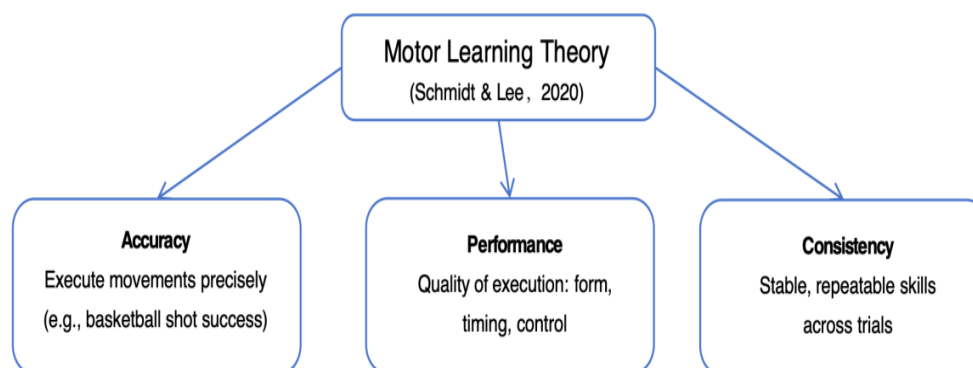
Guided by this framework, the study designed a 20-day intervention combining structured drills, video replay, teacher feedback, and self-analysis. The conceptual framework posits that integrating visual feedback into training will enhance shooting accuracy, technical execution, and consistency among female high school players. Supporting tools—such as a Physical Activity Readiness Questionnaire (PAR-Q), court evaluation checklist, and perception surveys—were employed to ensure reliability and contextual insight.

Figure 2.
20-day Training Program
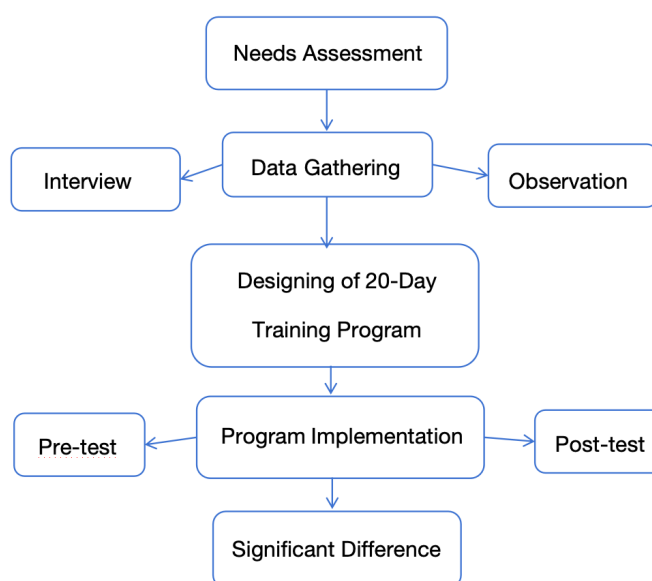
By linking Motor Learning Theory with practical training design, the study establishes a replicable model that connects theory, pedagogy, and application. Figure 1 illustrates the conceptual framework, showing how structured practice and video-assisted feedback reinforce motor control and contribute to improved performance outcomes.

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Statement of the Problem

Shoulder shooting is a critical skill in basketball, yet many high school female players continue to experience low accuracy, inconsistent form, and unstable performance. Traditional training programs often fail to provide immediate and personalized feedback, which limits players' ability to self-correct and improve effectively. Video replay-assisted training offers a promising, cost-effective, and replicable approach to enhance technical execution by combining structured practice, teacher guidance, and self-analysis. Despite its potential, limited research exists on its effectiveness in the context of high school girls' basketball, particularly in resource-limited schools. This study therefore seeks to evaluate the effectiveness, feasibility, and student acceptance of video replay-assisted training in improving fixed-point shoulder shooting accuracy and performance, while also identifying the challenges encountered in its implementation.

Research Objectives

General Objective:
- To determine the effectiveness of video replay-assisted training in enhancing the fixed-point shoulder shooting accuracy of high school female basketball players.

Specific Objectives:
1. To assess the baseline performance of participants in terms of shooting accuracy, form, and consistency prior to the intervention.
2. To evaluate the post-training performance of participants after undergoing video replay-assisted training.
3. To determine whether there is a significant improvement in shooting accuracy, form, and consistency between the pretest and posttest results.
4. To examine the perceptions of students regarding the effectiveness, benefits, and challenges of video replay-assisted training.
5. To explore the feasibility of integrating video replay technology into regular basketball instruction as a model for physical education reform.

Research Questions

1. What is the baseline shooting accuracy, form, and consistency of high school female basketball players before the training intervention?
2. What is the shooting accuracy, form, and consistency of participants after undergoing the video replay-assisted training program?
3. Is there a significant difference between the pretest and posttest shooting performance of the participants?
4. How do students perceive the effectiveness of video replay-assisted training in terms of improving accuracy, form, motivation, and confidence?
5. What challenges did students encounter during the implementation of the training program, and what suggestions do they provide for improvement?

Research Methodology

Research Design

This study employed a quasi-experimental one-group pretest–posttest design to evaluate the effectiveness of video replay-assisted training in improving fixed-point shoulder shooting accuracy among female high school basketball players. This design was chosen because it allowed for measurement of participants' baseline performance, implementation of the intervention, and comparison with post-intervention results to determine significant

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improvements. The design was appropriate given the limited number of participants and the practical constraints of implementing a control group in a school setting.

Population and Sampling

The participants were 20 female students aged 15–17 from the basketball team of Hohhot No. 8 Middle School, Inner Mongolia, China. All participants had a basic foundation in basketball but had not undergone systematic or professional training. The inclusion criteria were: (a) currently enrolled in the team roster, (b) physically fit to participate as confirmed by a PAR-Q health screening form, and (c) willingness to participate with signed parental consent. Students with a history of major sports injuries or medical conditions were excluded. The sample was purposively selected, as the study targeted the entire available population of female student-athletes in the school team.

Instruments

Two main instruments were used in this study:

1. Performance Checklist – A researcher-made observational tool was designed to record the number of successful shots during the daily three-minute fixed-point shoulder shooting tests. Content validation was conducted by three experts in physical education and sports coaching, with revisions applied to ensure clarity and alignment with technical standards.

2. Student Perception Questionnaire – A five-point Likert scale survey assessed students' acceptance of the training, perceived benefits, motivation, and encountered challenges. The questionnaire underwent expert validation for content relevance and face validity. Cronbach's alpha reliability testing yielded an acceptable internal consistency coefficient of 0.82.

Additionally, open-ended questions were included to gather qualitative insights on students' experiences and suggestions for program improvement.

Data Collection

Data were collected over a 20-day training cycle. Each day, participants underwent structured basketball drills, followed by a three-minute fixed-point shoulder shooting test, in which both attempts and successful hits were recorded. Video replays were used during training sessions for immediate feedback, but these were not included in the formal statistical analysis.

Baseline (pretest) data were recorded on Day 1, while posttest data were collected on Day 20. Intermediate assessments were conducted on Days 3, 6, 10, and 16 to track progress. At the end of the program, students completed the perception questionnaire and provided open-ended feedback. Data collection was conducted on-site at the school's indoor gymnasium under teacher supervision.

Data Analysis

Quantitative data from shooting accuracy tests were analyzed using descriptive statistics (mean, standard deviation, frequency, percentage) and paired-samples t-test to determine significant differences between pretest and posttest scores. A significance level of $p < 0.05$ was adopted.

Survey responses from the Likert-scale questionnaire were analyzed using frequency distributions and mean scores to assess student perceptions. Qualitative data from open-ended responses were subjected to thematic coding, where recurring themes related to benefits, challenges, and suggestions for improvement were identified and summarized.

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Ethics in Research

Ethical principles were strictly observed throughout the study. Informed consent was obtained from both students and their parents/guardians prior to participation. Confidentiality was maintained by coding all data and ensuring that individual names were not disclosed in reports. Participants completed the Physical Activity Readiness Questionnaire (PAR-Q) to screen for potential health risks before engaging in the training. All video recordings were used solely for instructional feedback and research purposes, with no public disclosure. The study adhered to the ethical guidelines of the National University Manila's research standards and was conducted in alignment with international research ethics protocols.

Results and Discussions

The pre-test assessment revealed that the majority of participants performed at a *Fair* level in terms of the BEEF (Balance, Eyes, Elbow, and Follow-through) shooting components. Nineteen out of twenty participants scored between 9 and 12, while only one attained a *Good* rating of 13. No participant achieved an *Excellent* score, confirming the lack of mastery in shooting fundamentals prior to the intervention. These findings are consistent with Gao and Chen (2020), who found that adolescent athletes often demonstrate inconsistent performance and unstable execution when lacking structured training feedback. Similarly, Amaro et al. (2023) emphasized that even slight deficiencies in alignment and gaze control can significantly reduce shooting accuracy in novice players.

After the 20-day structured training program, significant improvements were observed. Several participants (e.g., Participants 5, 10, 11, 12, and 20) achieved *Excellent* scores of 17–18, while most shifted from *Fair* to *Good* or higher. The improvement underscores the effectiveness of video-based training in strengthening basketball shooting fundamentals. This aligns with Tannoubi et al. (2023), who demonstrated that video modeling substantially improves accuracy and technical stability among youth basketball players. Moreover, Stoszkowski and Collins (2023) highlight that integrating video replay into practice not only corrects technique but also enhances learner engagement and confidence.

Quantitative analysis confirmed the significance of these gains. The pre-test weighted mean (WM) score of 2.38 (SD = 0.60, *Fair*) increased to 4.02 (SD = 0.42, *Very Good*) in the post-test. The computed t-value of 12.35 with $p < 0.05$ indicated a statistically significant difference between pre- and post-test scores. These results substantiate the claim that video-assisted feedback can meaningfully enhance accuracy, form, and consistency. Palao et al. (2022) likewise reported that systematic use of video feedback produces measurable improvements in technical execution and player development across team sports.

Perceptions of the training effectiveness were uniformly positive. Across the three skill dimensions—accuracy, performance, and consistency—all indicators received a perfect weighted mean of 5.00 (SD = 0.00, *Strongly Agree*). Students agreed that the video replay improved precision, form, timing, and the natural application of the BEEF technique. They also confirmed that they could maintain consistency across sessions, even under conditions of fatigue. These perceptions align with Krause et al. (2021), who found that athletes using video modeling and replay reported increased confidence, motivation, and self-regulated learning. Likewise, Zimmerman (1990) highlighted that structured self-analysis strategies promote autonomous learning and long-term performance gains.

Despite these improvements, challenges persisted. Participants reported difficulties in understanding technical instructions, overcoming ingrained habits, and maintaining focus during prolonged training. Physical factors such as fatigue and soreness, alongside motivational challenges like monotony and anxiety, also affected performance. Such barriers reflect the observations of Wulf and Lewthwaite (2021), who emphasized that attentional and motivational strategies must complement motor learning interventions to sustain progress. Similarly, Vansteenkiste et al. (2020) stressed that satisfying learners' psychological needs is essential for maintaining motivation and overcoming training-related challenges. Overall, while the intervention was highly effective, both external and personal factors influenced the extent of learners' progress.

Conclusion

The study confirmed that video replay-assisted training significantly enhanced basketball shooting skills among female high school players. Baseline findings indicated that most participants had only Fair proficiency in applying the BEEF fundamentals, but post-test results demonstrated substantial improvement, with many achieving Good to Excellent ratings. Statistical analysis validated the effectiveness of the intervention, while student perceptions

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highlighted the value of video replay in improving accuracy, performance, and consistency. Nevertheless, the presence of challenges such as instructional clarity, physical fatigue, and motivational barriers suggests that video-assisted training is most effective when paired with ongoing guidance, reinforcement, and individualized feedback.

Recommendations

- For School Administrators: Video replay technology may be integrated into physical education and sports programs as a cost-effective innovation. Administrators may also support teacher training and resource allocation to maximize the potential of video-assisted instruction.
- For Teachers and Coaches: Educators may adopt video playback to systematically analyze performance, provide individualized feedback, and facilitate reflective learning. Collaborative sharing of best practices may also strengthen instructional strategies.
- For Students: Learners may use video replay for self-analysis and peer evaluation to strengthen self-awareness and confidence. Incorporating this practice into regular routines may encourage independent and collaborative learning.
- For Parents: Parents may review video feedback with their children to monitor progress and provide encouragement. Active involvement at home may help sustain motivation and reinforce school-based training.
- For Future Researchers: Subsequent studies may explore the long-term impacts of video replay-assisted training, extend applications to other sports, or compare its effectiveness with other digital teaching tools. Cross-cultural validation may also be pursued to expand the global relevance of technology integration in physical education.

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