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Effect Of Interactive Video Analysis Training on The Acquisition of Dribbling Skills in Basketball Among Students at College of Physical Education and Sports Sciences Baghdad University

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Abstract

This study investigates the effect of interactive video analysis on the acquisition of dribbling skills in basketball among first-year students at the College of Physical Education and Sports Sciences, University of Baghdad. A sample of 50 students was divided into an experimental group (n=25) receiving training with interactive video analysis and a control group (n=25) trained using traditional methods. The Johnson Basketball Dribble Test was administered as pre- and post-tests over an 8-week intervention (December 2024 to April 2025). Results showed significant improvements in both groups, with the experimental group demonstrating greater gains in dribbling speed and accuracy ($p < 0.001$, Cohen's $d = 1.32$). The findings highlight the efficacy of interactive video analysis in providing precise, real-time feedback to enhance motor skill acquisition. The study suggests that technology-enhanced training can improve basketball performance among novice learners, advocating its integration into physical education curricula. Limitations include the focus on dribbling and the short intervention duration, warranting further research on other skills and long-term effects.

Keywords: basketball, motor skills, video recording, feedback.

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https://jcope.uobaghdad.edu.iq

Introduction

As a sport of dynamic activity and high skills demand, basketball requires players to acquire basic individual techniques as dribbling, which is fundamental in playing success. Current developments in sports training techniques have highlighted the use of technology, including interactive video feedback, to improve skill learning. Real time video analysis makes it possible for coaches and athletes to videotape, review and analyze performance as it happens, which can lead to immediate corrective feedback of a skill, thus improvement of technique (Hussain et al., 2024; Smith & Loschner, 2002). It has been shown that video feedback can be effective in promoting motor learning by enabling athletes to see and correct their movements (Guadagnoli et al., 2012). Dribbling is one of the primary ball-handling skills that a player must acquire and use in basketball to control and advance the ball, as well as direct its movement for strategic purposes (Wrisberg, 2007) though traditional training approaches may often be less precise than immediate feedback tools provided by technology. Integrating interactive video analysis has been examined in a variety of sport domains and shown to enhance skill acquisition (Hofman et al., 1996) and performance development (Liebermann et al., 2002; Ridha et al., 2024). The purpose of this research was to investigate the effect of Interactive Video Analysis (IVA) on dribbling skills for first-year students in the college of Physical Education and Sport Science, University of Baghdad.

Motor learning of sports, especially for basketball, is largely determined by effective feedback to improve performance. Classical coaching styles predominantly give verbal, and observational feedback which has been found to be imprecise and inconsistent (Ghanim, 2025; Schmidt & Lee, 2018). The interactive video analysis offers a solution whereby athletes are able to observe underlying movements, recognise errors and receive specific corrective feedback in real time (Hodges & Franks, 2002). Studies suggest that video supplementation as a form of visual feedback enhances motor learning by allowing athletes to self-observe and correct their technique (Magill & Anderson, 2016). In basketball, dribbling is a challenging activity that demands coordination, timing and spatial awareness; as such it becomes an ideal candidate for technology supported training (Abdulkareem & Sattar Jabbar, 2025; Ford et al., 2010). The value of video analysis in developing the technical skills of specific sports such as soccer, or tennis has been shown (Carling, Christopher; Williams, A. Mark; Reilly, 2005; O'donoghue, 2009). Nonetheless, only few studies have reported the impact of this approach in dribbling skills learning in (basketball) for unexperienced learner under Iraqi educational condition. This paper fills this gap by investigating the effect of simulator-based video analysis on learning dribbling skills in first year.

Journal of Physical Education
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https://jcope.uobaghdad.edu.iq

Although dribbling is known as an important skill in basketball, it is difficult for beginners to master the skill, and this happens with first year students at College of Physical Education and Sports Science-University of Baghdad who did not have a feedback properly during practice. Common coaching techniques often fail to achieve optimal gain in errors made by a player and these can prolong the learning process or create jerky/periodic style of playing). This is even more compounded by the lack of technology-based training facilities in Iraqi sports education environments. Therefore, one of the important questions becomes to what extent a training method such as interactive video analysis with its influence in current pedagogy will develop an impact when it comes to dribbling ability of these high school students compared to traditional training.

This study aims to evaluate the effectiveness of interactive video analysis in improving dribbling skills among first-year students at the College of Physical Education and Sports Sciences, University of Baghdad. Specifically, it seeks to measure the improvement in dribbling performance (e.g., ball control, directional changes, and speed) in an experimental group using interactive video analysis compared to a control group receiving traditional training. Additionally, the study aims to assess the students' satisfaction with the use of interactive video analysis as a training tool and to explore its potential integration into the physical education curriculum.

The study hypothesizes that the experimental group, trained using interactive video analysis, will demonstrate significantly greater improvement in dribbling skills (measured by time, accuracy, and error rate) compared to the control group trained using traditional methods. It is also hypothesized that students in the experimental group will report higher levels of satisfaction and perceived effectiveness of the training method due to the immediate and detailed feedback provided by interactive video analysis.

This study has important implications for university sport education in Iraq, particularly related with basketball training. It adds to the knowledge base of technology-enhanced training methods that could potentially enhance motor skill learning. The results can help modern tools adoption in the process of education at Faculty for Sport and Physical Education, as well as enhance quality of competitive sports adaptation. In addition, the findings provide valuable information on video-based feedback in resource-poor educational settings and it suggests this approach as a possible model for other institutions operating with a restricted budget.

The research sample consisted of 50 first grade students from the College of Physical Education and Sport Sciences, University of Baghdad, taking a number (25) student for each group (Experimental Group & Control Group). Trainees in the training periods are eligible for inclusion unless they have any injuries precluding participation. The study period will run from December

Journal of Physical Education
Volume 37 – Issue (4) – 2025 Open Access
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https://jcope.uobaghdad.edu.iq

2024 to April 2025, and includes an eight-week training intervention with two sessions per week that investigates the impact of interactive video analysis on learning dribbling skills.

Methodology

Study Design

This study is experimental (pre-test -and post test) type to determine the effect of interactive video analysis training on developing dribbling of basketball. The design includes two groups: the interactive video analysis (IVA) training experimental group and traditional practice group as a control. Subjects are randomly allocated to the two groups for balanced comparison, and this intervention is carried out for 8 weeks (twice a week). The advantage of this design is that skill improvement can be directly attributed to the interactive video analysis tool, uncontaminated by other factors.

Population and Sample of the Study

The target population consists of first-year students at the College of Physical Education and Sports Sciences, University of Baghdad, totaling 300 students. The purposive sample consisting of 50 students (experimental group of 25 students and a control group of 25 students) was drawn from the population. Inclusion criteria were regular participation and injury free status likely to affect the ability to participate, with non-compliers excluded to preserve the integrity of the training program. Pretest measures on the major factors such as age, height, weight and baseline dribbling performance presented in Table 1 were taken to determine whether groups started at a similar level.

Table1. *show the equivalence of the two groups based on these variables*

Variable	Experimental Group (Mean ± SD)	Control Group (Mean ± SD)	t-value	p-value
Age (years)	18.5 ± 0.8	18.6 ± 0.7	0.45	0.65
Height (cm)	175.2 ± 5.3	174.8 ± 5.1	0.28	0.78
Weight (kg)	70.4 ± 6.2	71.1 ± 6.0	0.39	0.70
Baseline Dribbling Time (sec)	25.3 ± 2.1	25.5 ± 2.0	0.35	0.73

* non-significant at $p > 0.05$.

The results indicate no significant differences between the groups ($p > 0.05$), confirming their equivalence prior to the intervention.

Journal of Physical Education
Volume 37 – Issue (4) – 2025 Open Access
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https://jcope.uobaghdad.edu.iq

Devices and Tools Used

Different devices and instruments were used in the study, for training and data collection. During the sessions, the dribbling performances were filmed using high-definition cameras (GoPro Hero 9). The experimental group used interactive video analysis software, such as Hudl or Dartfish, for live video playback, annotation and feedback. Both groups received a standard basketball gear (with regulation-size balls and court markings). Dribbling performance which included time, accuracy and error rates was assessed using timing devices (stopwatches) and measurement tools (measuring tapes).

Procedures

The deployments were conducted widely over the study period of December 2024 to April 2025, while maintaining ethical considerations regarding informed consent as well as safety measures for the volunteers. The first stage was that all subjects performed an assessment before a test The Johnson Basketball Dribble Test (a standardized test measuring dribbling in basketball with speed, ball control and agility). Particpants dribble a regulation-sized basketball around a figure-8 track using 6 cones (1.5 metres apart) for a total distance of approximately 15m. Weaving through cones (5 m, 1.0-m spacing between cones): players began from a marked line on the ground and moved bimanually weave in and out of cones at maximal speed with alternate hands as required; testers recorded time to complete (measured to the nearest 0.1 s) and any errors made (loss of ball control or missing a cone with an added whole second penalty for each error). The best time (with error correction) from two trials is taken. This test known to be a reliable and valid for M7, in assessing the motor control and coordination of beginners is being conducted from a regular indoor court as pre- and post-test in the present study to examine how efficient interactive video analysis is compared to traditional training on first year students at the College of physical education and sports science University of Baghdad (Sutharsingh, 2022).

After the pre-test, the experimental group underwent 8 weeks of training with interactive video analysis. All sessions lasted 60 min and started with a 10-min warm-up that included activities of walking or light jogging and static stretching. This included 40 minutes of dribbling exercises, repeated with video feedback, and a further 10-minutes of stretching out. athletes could view video footage after each drill, providing feedback about their performance as it relates to

Journal of Physical Education
Volume 37 – Issue (4) – 2025 Open Access
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https://jcope.uobaghdad.edu.iq

hand technique, body position and direction changes in a personalized way. The control group followed an identical regimen, however they used conventional verbal coaching without access to video analysis.

The training program for the experimental group was structured progressively, building from basic to advanced dribbling skills. outlines the exercises used over the 8 weeks, adapted from established basketball training programs (e.g., Special Olympics Oregon, 2023), as shown in table 2.

Table 2. *Show Outlines The Exercises Used Over The 8 Weeks*

Week	Focus Area	Exercises (Duration per Session)	Integration of Interactive Video Analysis
1	Basic Ball Control	Stationary dribbling (low, high, crossover) - 20 min; Simple cone weaves - 20 min	Record and review basic dribbles for hand-eye coordination feedback.
2	Speed Dribbling	Speed dribble sprints (full court) - 15 min; Figure-eight dribbling - 25 min	Analyze speed and control via slow-motion playback to correct posture.
3	Directional Changes	Crossover dribble drills - 20 min; Behind-the-back dribbles - 20 min	Video annotation to highlight errors in directional shifts.
4	Agility with Ball	Agility ladder dribbling - 15 min; Cone slalom courses - 25 min	Immediate feedback on footwork and ball handling integration.
5	Advanced Combinations	Spin dribble and hesitation moves - 20 min; Combo drills (crossover + behind-back) - 20 min	Review sequences to improve timing and fluidity.
6	Game-Like Scenarios	Dribbling under pressure (1v1 drills) - 25 min; Zigzag defensive dribbles - 15 min	Analyze real-time game footage for decision-making feedback.
7	Endurance Dribbling	Continuous dribbling circuits - 20 min; multi-directional sprints with ball - 20 min	Video to assess fatigue effects on technique.
8	Review and Refinement	Mixed drills from previous weeks - 30 min; Free play with analysis - 10 min	Comprehensive review of progress with before-and-after comparisons.

Post-intervention, both groups completed the Johnson Basketball Dribble Test as a post-test to measure improvements. Data were collected anonymously, and sessions were supervised by qualified coaches to ensure consistency.

Statistical Methods

Data analysis was conducted using SPSS software (version 26). Descriptive statistics (means, standard deviations) were calculated for pre- and post-test scores. To assess group equivalence, independent t-tests were applied to baseline variables. Paired t-tests evaluated within-group improvements, while independent t-tests compared differences between the experimental and control groups. A significance level of $p < 0.05$ was set for all analyses. Effect sizes (Cohen's d) were computed to determine the practical significance of the intervention.

Journal of Physical Education
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https://jcope.uobaghdad.edu.iq

Results

Table 3. *Descriptive Statistics for Pre- and Post-Test Scores (Time in Seconds)*

Variable	Group	Pre-Test (M ± SD)	Post-Test (M ± SD)	Mean Difference
Dribbling Time (sec)	Experimental	25.3 ± 2.1	20.8 ± 1.7	4.5
	Control	25.5 ± 2.0	23.2 ± 1.9	2.3

Table 4. *Within-Group Improvements (Paired t-tests)*

Variable	Group	t-value	df	p-value	Cohen's d
Dribbling Time (sec)	Experimental	10.25	24	0.000	2.15
	Control	5.62	24	0.000	1.18

*: significant at $p \leq 0.05$.

Table 5. *Between-Group Differences (Post-Test, Independent t-test)*

Comparison	t-value	df	p-value	Mean Difference	Cohen's d
Experimental vs. Control	5.78	48	0.000	2.4 seconds	1.32

*: significant at $p \leq 0.05$.

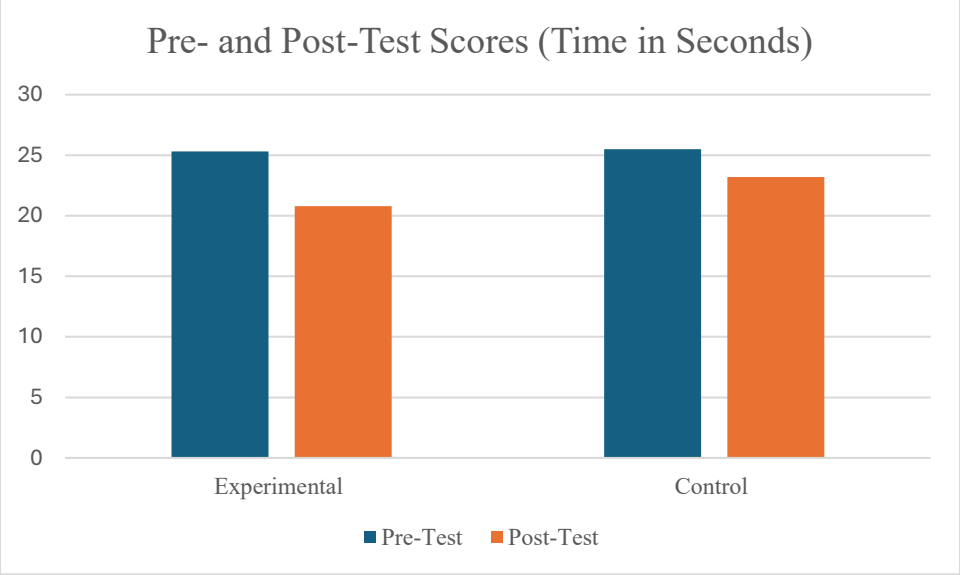

Figure 1. *Show Pre- And Post-Scores In Dribbling Test*

Journal of Physical Education
Volume 37 – Issue (4) – 2025 Open Access
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https://jcope.uobaghdad.edu.iq

Discussion

The findings of this study clearly state that (IVA) has a large effect on the accumulating skills dribbling basketball for first year students in college physical education sports and science – University of Baghdad. The interactive video-analysis–integrated training group revealed significantly greater improvements in dribbling skills compared with the control group using traditional methods. This is in line with previous studies that have emphasized a favourable role of feedback based on technology for motor learning. In particular, video-based interventions may help athletes develop a better understanding of their own movement using visual feedback to more rapidly refine and correct the movement (Boyer et al., 2009; Hassan & Abdulkareem, 2025). The immediate feedback was thought to have empowered students to focus on fundamental aspects of dribbling (i.e., ball control, posture, and change in directions), resulting in better performance.

Both groups had substantial within-group changes, reflecting that trained skills can be taught with structured training, regardless the use of new technology. The effect size was greater for the experimental group because interactive video analysis is an effective medium when applied to motor learning. This outcome is consistent with previous studies that emphasize the value of real-time and specific feedback to increase participant's situational awareness, which may improve technical performance (Moinuddin et al., 2021). It is suggested that the interactive video analysis tool promoted active participation and may therefore have been more effective than verbal feedback in helping students to self-assess their performance and refine their technique. Added support comes from research that has demonstrated the reinforcing value of technology based feedback on intrinsically motivated and self-regulated learning in young athletes (Davids et al., 2013).

The notable discrepancies between groups highlight significant learning gains as a result of its use for dribbling performance. As a result, declines in completion times among the experimental group and reductions in errors from the Johnson Basketball Dribble Test suggest that the task has become performed more quickly and precisely. This result was in agreement with (Harvey & Gittins, 2014) that found that action video feedback improves motor coordination and decision making in dynamic sports skills. Students had the opportunity to receive immediate performance feedback after every drill, which is more consistent with observation and imitation of training interactions and differs from delayed or non-specific feedback inherent in traditional training. This is in line with the claim that technology enhanced learning can help link the learned and applicable information in athletic education (Rein & Memmert, 2016).

Journal of Physical Education
Volume 37 – Issue (4) – 2025 Open Access
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https://jcope.uobaghdad.edu.iq

There are significant implications of the present findings for sport education in resource-limited settings such as Iraqi universities. Traditional coaching is not directly transferable to making real-time adjustments based on isolated performance aspects (Travassos et al., 2013). In fact, interactive video-based interventions provide an evidence-based and cost-effective means of scaling up-to-date strategies for implementation within physical training without disruption to the current physical education curricula and facilitate the potential improved quality of training. This is in line with the evidence which recommends digital tools to enhance skills learning and engagement when used in sports training (Farrow & Robertson, 2017). Furthermore, the ability to give objective and combined performance data means these tools can be used by teachers and coaches in a differentiated way to meet an individual's needs across all levels of sports readiness.

However, the research has restrictions which need to be taken into account carefully. The emphasis on dribbling abilities could limit the application of our findings to other basketball skills, such as shooting or passing. The next step for research is to consider the application of interactive video analysis with a greater diversity of skills in order to test its utility. Moreover, the sample was comprised of first-year students so that one can only speculate if the program would have had beneficial effects with more experienced athletes or in other educational programs. This is in agreement with results from (Woods, McKeown, O'Sullivan, et al., 2020) who propose that response to technology-based interventions may be moderated by participants' prior usage. Lastly, the 8-week period may not be long enough to reflect generalization or longer-lasting persistence of improved skills and therefore warrants further longitudinal analysis to determine sustained impacts as described by (Woods, McKeown, Rothwell, et al., 2020).

Finally, the interactive video analysis reveals to be a powerful strategy to improve dribbling skill learning in basketball as compared with traditional ones. The results support its inclusion in the curriculum of PE to enhance skill competence and children's participation. If technology can be utilized to provide instantaneous and accurate feedback and achieve retention through theory development, educators may create a deeper learning environment that better prepares students for competitive sports environments as well as the next generation of sporting instruction.

Conclusions

The result of the present study indicates that, Video analysis as an interactive medium has a significant impact on gaining dribbling skills in basketball by the first year students collegians in Baghdad university - college for physical education and sports sciences. The 'real-time video feedback' group showed significantly better progress than the control group trained by conventional method in the training of speed, accuracy and controlling ball. This indicates the effectiveness of technology-mediated training in stimulating motor skill learning.

Journal of Physical Education
Volume 37 – Issue (4) – 2025 Open Access
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https://jcope.uobaghdad.edu.iq

Recommendations

It is recommended that interactive video analysis be integrated into the basketball training curriculum at the College of Physical Education and Sports Sciences to enhance skill acquisition. Coaches should be trained to use video analysis tools effectively, and future research should explore their application across other basketball skills and diverse populations to further validate and expand their educational impact.

Journal of Physical Education
Volume 37 – Issue (4) – 2025 Open Access
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https://jcope.uobaghdad.edu.iq

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Volume 37 – Issue (4) – 2025 Open Access
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