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Impact of Instant Visual Guidance via Video Technology on the Correction of Some Offensive Skills Performance Errors in Basketball

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Abstract

Background: Various methods of instructional feedback, whether provided before, during, or immediately after performance, come in different forms, such as verbal communication, educational booklets, and video technology. Choosing the most suitable feedback method is crucial to help learners pinpoint specific motion segments contributing to errors.

Objectives: This study aimed to compare 2 feedback methods and assess their impact on correcting errors in beginners' basketball skills. The control group received verbal correction during the performance, occasionally supplemented by educational booklets. In contrast, the experimental group received immediate visual correction using video technology right after the performance.

Methods: A total of 80 beginner learners participated in this study, randomly divided into the control group (n = 40) and the experimental group (n = 40). The experiment spanned 8 weeks, with two sessions conducted per week.

Results: Positive results were observed for both feedback methods when comparing pre- and post-measurements within each group. However, upon comparing post-measurement results between the two groups, the results appeared in favor of the immediate visual correction method.

Conclusions: The immediate visual correction method utilizing video technology demonstrated greater effectiveness in rectifying errors in learners' basketball skills.

Keywords: Feedback, Video, Technology, Basketball

1. Background

Instructional feedback plays a crucial role in the educational process, particularly in the context of acquiring new sports skills. It encompasses all corrective information that learners receive from various sources to modify incorrect behaviors and achieve optimal performance (1). It is regarded as a form of guidance and counseling that helps save time and effort, expediting the learning process (2). Feedback provides learners with insights into their performance, enabling them to identify mistakes and adjust their movements with the appropriate force (3). It can be administered before, during, or after performance and can employ a variety of methods and techniques (4). Feedback enhances proper techniques, eliminates incorrect behaviors, and boosts learners' motivation to practice and outperform their peers (5). It can also help overcome learning plateaus, often caused by teachers relying on limited feedback methods that fail to focus learners' attention on the minute details responsible for movement errors (6). Research indicates that the effectiveness and pace of learning are tied to learners' attention characteristics (7). A teacher's exclusive use of a single teaching method and feedback approach might not lead to desired learning outcomes (8). Consequently, it becomes necessary to develop alternative feedback techniques to break through these learning plateaus. Previous studies have shown positive outcomes when incorporating video and audiovisual technology, images, and circular films that align with learners' performances (9). There is limited research that allows learners to use video technology to observe their performance and compare it to an ideal performance.

This study hypothesized that the immediate visual correction method using video technology would yield better results than verbal correction and the use of an educational booklet. The current study aimed to compare two corrective feedback methods. The first method was administered verbally to the control group

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after their performance, occasionally supplemented by an educational booklet. The second method, involving the use of video technology, was presented visually and immediately to the experimental group.

2. Objectives

The present study aimed to compare two methods of providing corrective feedback to learners. The first method involved verbal feedback given to the control group after their performance, sometimes accompanied by an educational booklet. The second method entailed immediate visual feedback provided to the experimental group, who used video-based technology while watching an educational video featuring an ideal performance as a reference for correcting motor behavior.

3. Methods

3.1. Participants

The study involved 80 beginner learners out of the 90 enrolled in the second-grade exams at the College of Physical Education and Sports Sciences, the University of Anbar, Iraq. The inclusion criterion for participants was that they should not be practicing basketball players. Ten individuals were excluded, comprising those who were absent and those exclusively engaged in basketball practice. Ethical approval for the study was obtained from the Scientific Research Ethics Committee of the College of Physical Education and Sports Sciences, the University of Anbar.

The learners were briefed on the study procedures and granted the right to decline participation before data collection. All participants consented to partake under the condition of anonymity. The minimum sample size for the study was determined using the Thompson equation (10). To ensure control over study variables, a homogeneity assessment was conducted for height, weight, and age using the Shanghe device manufactured in Henan, China. Following data collection and subsequent statistical analysis, skewness coefficient values were observed to fall within the acceptable range of (± 1), signifying a satisfactory level of homogeneity (Table 1).

Table 1. Statistical Description of Learners' Characteristics (n = 80) [a]

Variables	Mean ± SD	Median	Skew
Age (y)	19.487 ± 0.711	19	1.126
Height (cm)	174.462 ± 5.143	174	0.323
Weight (kg)	76 ± 5.426	77	0.105
Chest pass	12.900 ± 1.239	12.900	0.104
Bounce pass	9.100 ± 0.894	9	0.671
Low dribble	11.385 ±1.728	11.200	0.032
High dribble	15.541 ± 2.211	15.350	0.017

[a] ± 1 is an acceptable torsion coefficient.

3.2. Research Design

This study employed the experimental method by designing equal groups with pre- and post-measurements. The study sample was randomly divided into two groups. One group is a control group comprising 40 learners who received verbal feedback and utilized an illustrated educational notebook during the educational activities in the lecture. These methods are commonly employed in educational basketball lectures. The experimental group, consisting of 40 learners, utilized instant feedback through video-based technology for immediate visual guidance to correct their performance errors. They also watched a video featuring an exemplary performance. This novel approach, proposed by the researchers, involves videotaping the learner's performance, which is then presented to them immediately after executing the skill. Learners can view their performance using both normal and slow-motion techniques, identify their mistakes, and compare their performance with the ideal execution of the same skill. The study spanned 8 weeks, with two 90-minute educational sessions per week for each group. It is essential to note that the educational content, allocated time, and educational objectives were consistent across these lessons. The key difference lies in the method of providing corrective feedback to each group separately.

3.3. Determination of Study Variables and Measurement Methods

After reviewing the curriculum assigned to the study sample, the study identified offensive basketball skills as a focal point for the first course. These skills encompass chest passing, bounce passing, low dribbling, and high dribbling. Several measurements pertaining to these skills were collected and subsequently reviewed by experts in measurement and evaluation and in motor learning within the context of basketball. Four measurements were deemed reliable in accurately assessing these skills. These measurements were used for pre- and post-assessments under the supervision of a neutral team of experts in measurement, evaluation, and motor learning in basketball. All team members were affiliated with the College of Physical Education and Sports Sciences, University of Anbar. These measurements were conducted without any intervention from the researchers or the instructor. The measurements included as follows: 10

passes were performed directly from chest level toward a wall 270 cm away, and then the time for performing the 10 passes was calculated (11). Direct and bounce passes were performed on two circles with a diameter of 40 cm. The first circle was painted on the ground, where the learner was 170 cm away from it when performing the pass. The second circle was painted on a wall, whose center was 140 cm above the ground and 100 cm away from the first circle. Ten bounce passes were repeated inside the two circles towards the ground and the wall. After the performance, one score was calculated when each circle got hit, with a maximum of 20 scores (12). A low dribbling was performed with the ball back and forth in the shape of the number (8) between four bars with a height of 120 cm. The first person is 200 cm away from the starting line and 140 cm between each. Then, the time was calculated (13). The ball was hit high around the corners of half the basketball court, and then the time was calculated (14) (Figure 1).

3.4. Procedures for Providing Instant Feedback Using a Video-Based Technology

3.4.1. Preparatory Procedures

(1) The experimental group was organized into four cooperative groups within the sports activities court, which measured 20 × 40 meters, 15 minutes before the start of each lesson. This period served as the break between lessons. The court was a multipurpose facility that included a basketball court layout. Each of these groups comprised 10 learners, and they were allotted specific spaces for carrying out the educational activities.

(2) Each cooperative group was provided with a 50-inch camera tripod and two Galaxy Tab S7 devices (Samsung, South Korea), each equipped with a 13-megapixel rear camera. One tablet was used to record the learners' performances, although the other contained four educational videos demonstrating the four skills under study, each performed perfectly.

(3) Within each group, two learners were assigned: One was responsible for filming the performance of their peers using a tablet device mounted on a tripod, and the other was tasked with taking photographs. Instructions were provided on adjusting the camera lens for distance, height, and tripod placement to achieve the desired shooting angle during skill execution. They were also instructed on how to use the tablet, the video recording application, and how to save and replay videos at normal and slow playback speeds. All of these activities were conducted under the supervision of the assistant work team to ensure procedural organization and efficiency.

3.4.2. Practical Procedures for Providing Instant Feedback Using Video-Based Technology

After each learner completed the individual skill (basketball dribbling), they were instructed to proceed directly to review their performance video. For two-person skills (basketball passing), both learners were directed to watch an educational video demonstrating ideal performance, allowing them to compare it to their own. This comparison aimed to identify any mistakes made during the performance. Learners were then instructed to reattempt the skill to correct these errors and approach optimal performance. This procedure was closely supervised by the assistant work team.

3.5. Statistical Analysis

The collected data, verified for normal distribution, underwent statistical processing using IBM SPSS Statistics software (version 20). The paired samples *t*-test was employed to compare pre- and post-test results in each group individually. The independent samples *t*-test was utilized to compare post-test results between the two study groups. Furthermore, effect sizes were calculated using Eta squared from analysis of variance (ANOVA), with effect sizes categorized as small (0.01), medium (0.06), and large (0.14) (15). A probability threshold of $P \geq 0.05$ was set for the study.

4. Results

Table 2 shows the results of statistical analyses, including the arithmetic mean, standard deviation, *t*-values, and P-values, for comparing the pre- and post-measurements of both the control group and the experimental group as follows: In the measurements for the control group, which received verbal and visual feedback using the educational notebook, significant improvements were observed in the post-measurement scores for the chest pass (12.015, ± 1.065, P = 0.000), bounce pass (11.550, ± 1.376, P = 0.000), and high dribbling (13.862, ± 1.587, P = 0.000). Similarly, in the post-measurements of the experimental group, which received instant feedback using video-based technology, significant improvements were noted in the chest pass (11.276, ± 1.414, P = 0.000), bounce pass (11.950, ± 0.875, P = 0.000), and high dribbling (11.429, ± 1.476, P = 0.000). However, it is important to note that there were no statistically significant differences between the pre- and post-measurements in dribbling for both groups. Nonetheless, a marginal improvement can be inferred by examining the differences in arithmetic means between the pre- and post-measurements for both the control group (10.215, ± 1.341, P = 0.217) and the experimental group (12.180, ± 1.304, P = 0.116).

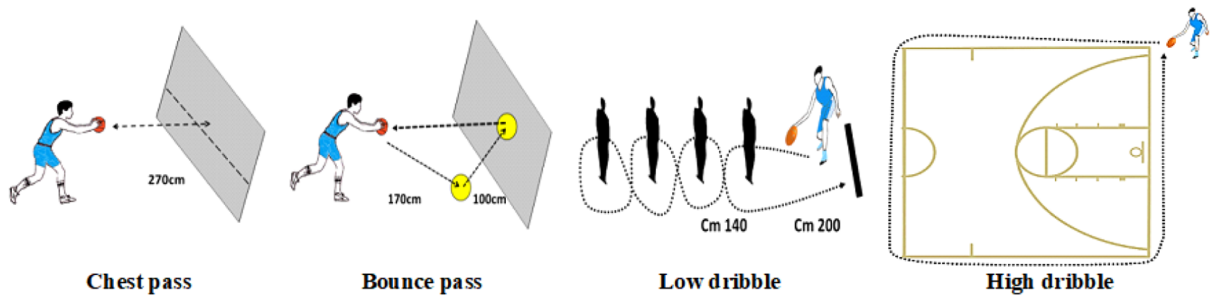

Figure 1. Measurements of offensive skills in basketball

Table 2. Comparison of Pre- and Post-measurement Results for Both Control and Experimental Groups [a]

Groups	Variables	Unit of Measurement	Measure	Arithmetic Mean	Standard Deviation	Mean Differences	Deviation of Mean Differences	*t*-Test	P-Value
Control (n = 40)	Chest pass	Time	Pre	12.795	± 1.043	0.780	1.183	4.167	0.000
			Post	12.015	± 1.065				
	Bounce pass	Score	Pre	9.300	± 0.966	2.250	1.720	8.269	0.000
			Post	11.550	± 1.376				
	Low dribble	Time	Pre	10.625	± 1.707	0.410	2.068	1.254	0.217
			Post	10.215	± 1.341				
	High dribble	Time	Pre	17.220	± 1.268	3.357	2.455	8.648	0.000
			Post	13.862	± 1.587				
Experimental (n = 40)	Chest pass	Time	Pre	13.005	± 1.414	1.729	1.441	7.585	0.000
			Post	11.276	± 1.414				
	Bounce pass	Score	Pre	8.900	± 0.777	3.050	1.036	18.610	0.000
			Post	11.950	± 0.875				
	Low dribble	Time	Pre	12.555	± 1.200	0.375	1.475	1.607	0.116
			Post	12.180	± 1.304				
	High dribble	Time	Pre	13.862	± 1.587	2.433	1.889	8.145	0.000
			Post	11.429	± 1.476				

[a] The differences are significant below the error level $\leq$ 0.05 in front of the degree of freedom (40 - 1 = 39).

Table 3 and Figure 2 show the statistical analyses of the arithmetic mean, standard deviation, and *t*-values to make a comparison between the control and experimental groups in terms of the post-measurements. The results of the present study showed that the mean and deviation of the post-measurement of the chest pass for the control group was 12.015 ± 1.065; however, it was 11.276 ± 1.414 for the experimental group. When comparing the means, a statistically significant value (t = 2.801), with a high effect size of 0.160, appeared in favor of the experimental group with the shorter arithmetic mean time. The results also showed that the mean and deviation of the post-measurement of the bounce pass for the control and experimental groups were 11.550 ± 1.376 and 11.950 ± 0.875, respectively. When comparing the means, a statistically significant value (t = 1.551), with a high effect size of 0.143, appeared in favor of the experimental group with the highest mean score. The results also showed that the mean and deviation of the post-measurement of the low dribbling were 10.215 ± 1.341 and 12.180 ±1.304 for the control and experimental groups, respectively.

When comparing the means, a statistically significant value (t = 4.578) appeared with a small effect size of 0.028 in favor of the control group with the shorter arithmetic mean time. The results also showed that the mean and deviation of the post-measurement of the high dribbling for the control and experimental groups were 12.862 ± 1.587 and 11.429 ± 1.476, respectively. When comparing the means, a statistically significant value (t = 2.454) appeared with an average effect size of 0.128 in favor of the experimental group with the shorter arithmetic mean time (Figure 3).

5. Discussion

The primary objective of this study was to investigate the impact of instant feedback using video-based technology, serving as immediate visual guidance

Table 3. Statistical Analyses Between Control and Experimental Groups in Post-measurements

Variables	Unit of Measurement	Groups	Arithmetic Mean ± Standard Deviation	*t*-Test	Effect Size
Chest pass	Time	Control	12.015 ± 1.065	2.801	0.160
		Experimental	11.276 ± 1.414		
Bounce pass	Degree	Control	11.550 ± 1.376	1.551	0.143
		Experimental	11.950 ± 0.875		
Low dribbling	Time	Control	10.215 ± 1.341	4.578	0.028
		Experimental	12.180 ± 1.304		
High dribbling	Time	Control	12.862 ± 1.587	2.454	0.128
		Experimental	11.429 ± 1.476		

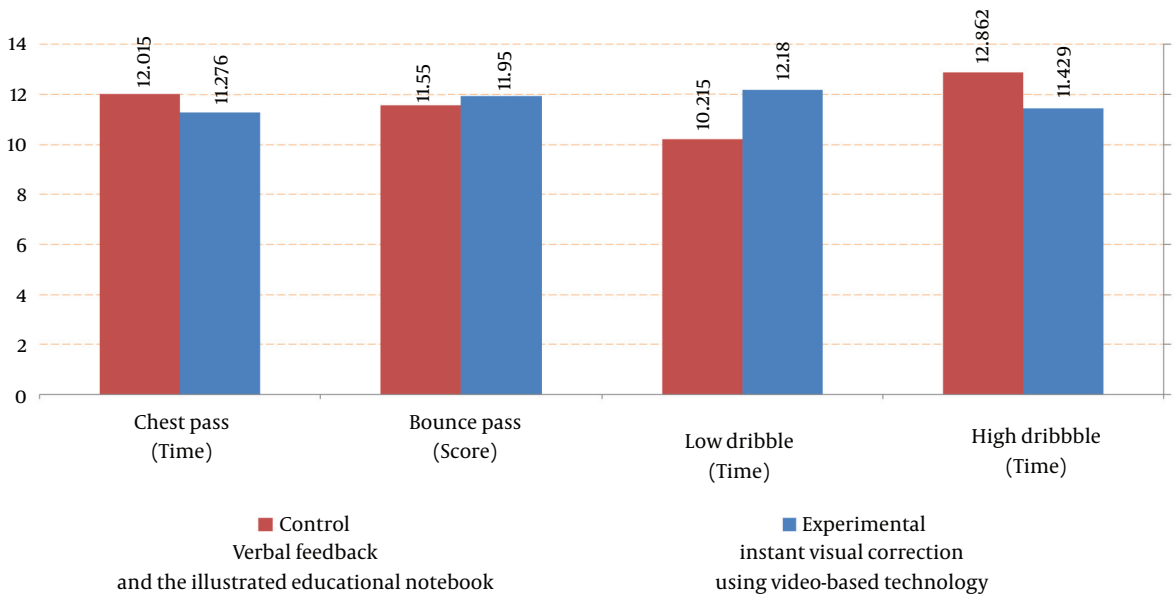

Figure 2. Comparison of pre- and post-measurement results for both control and experimental groups

for detecting and rectifying performance errors. This approach was compared to a method proposed by the current study, which involved viewing an educational video demonstrating ideal performance. It was also compared to the traditional methods of verbal feedback and an illustrated educational booklet for correcting mistakes in four basketball skills, which were the variables under study. In the pre-measurement stage, no statistically significant differences were observed between the two groups in the aforementioned variables. However, after providing feedback to each group according to its type, there was a noticeable improvement in performance. This result aligns with the findings presented in the study by Zhou et al. (16). Zhou et al.'s study emphasized that corrective feedback, depending on its type and timing, yields positive results for students' learning sports skills and effectively contributes to modifying incorrect behaviors at various levels (16).

The present study hypothesis was that the instant feedback method using video-based technology would outperform the traditional methods in all study variables. The study validated the hypothesis in the results of three variables, namely the chest pass skill, the bounce pass skill, and the dribbling skills, all demonstrating high effect sizes. These results indicated that the instant visual correction method using video-based technology had a positive and effective impact on helping learners correct performance mistakes in the two key aspects. The first aspect gave each learner, at the appropriate time, sensory information about the mistakes after seeing them

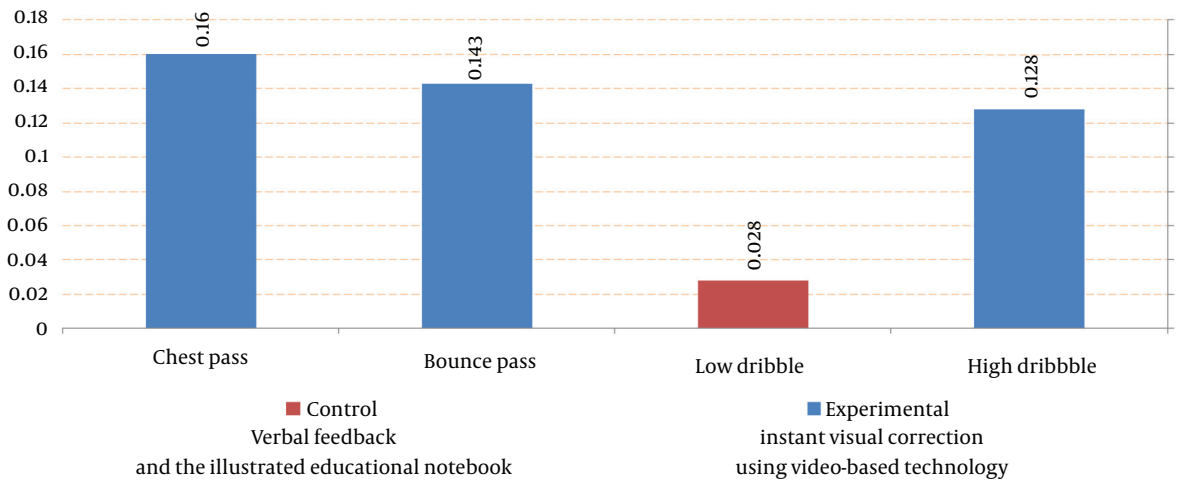

Figure 3. Effect size of the corrective feedback method for each group

using the tablet device. The second aspect enhanced the ideal performance video by showing the learners' performance with ideal motor models that enabled them to compare their wrong behaviors to the correct ones. It helped them in the sensory prediction of their mistakes, identification of those errors, and extraction of the sensory information necessary for motor planning to form a mental image. This approach helped them learn the process and gradually eliminate errors (17-20). Instant visual feedback contributes to improving motor learning, spontaneity in motor control, and the discovery of new movements (21).

The findings of the present study align with those of studies that have developed effective instant corrective feedback methods for teaching basketball skills. For example, a study conducted by Olteanu et al. concluded that basketball free throws could be improved using instant feedback in the form of a system linked to a high-resolution video camera that detects the ideal path of the ball trajectory for learners during free throw attempts (22). Truong et al.'s study also demonstrated enhanced learning of basketball free throw skills through instant feedback in error-based correction (23). Additionally, Taha et al. determined that teaching various passes and goals in basketball could be improved by employing delayed visual feedback in addition to instant verbal feedback (24). Furthermore, the results of the present study are consistent with the results of studies that have developed effective feedback interventions for other sports skills. For instance, El Badry Shaaban and Madkour's study concluded that instant feedback via educational video enhanced the performance of attack and defense skills for beginners in fencing (25).

However, the current study yielded unexpected results in the low-ball dribbling test, where the control group outperformed the experimental group. This finding is attributed to the fact that the instructor's verbal feedback in the control group provided learners with opportunities to recognize and correct mistakes in multiple aspects. In contrast, instant feedback via video-based technology provided the experimental group with only one viewing angle using a single tablet device during filming, which did not capture all aspects of the mistakes. This limitation might have led to a lack of understanding of the mistakes during ball dribbling, as this skill involves continuous changes in body direction and ball handling. This led to concealing parts of the performance in which mistakes occurred, and the members of the experimental group did not pay any attention to them. It is recommended to use multiple camera angles to capture any skill that involves continuous changes in the direction of the body or one of its parts or an exchange of direction of a game tool, such as a ball, during the performance of the skill, to provide learners with a comprehensive view of their performance and enable them to identify and correct mistakes effectively.

5.1. Conclusions

The current study demonstrated that verbal correction with an educational booklet and immediate visual correction with video technology yield positive results for correcting learners' performance errors. However, immediate visual correction using video technology with

slow and normal playback appears to be more effective, as evidenced by the results of the experimental group.

Footnotes

Authors' Contribution: Manaf M. Hassan: Study design, data collection, statistical analysis, and manuscript preparation; Hameed H. Khalaf: Data collection, statistical analysis, manuscript preparation, and fund collection; Omar A. Mosleh: Data collection, and fund collection.

Conflict of Interests: The authors have no conflict of interest to declare.

Ethical Approval: Ethical approval was obtained from the Scientific Research Ethics Committee of the College of Physical Education and Sports Sciences, the University of Anbar (No. 12315 on 22-6-2022).

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References

1. Mandouit L, Hattie J. Revisiting "The Power of Feedback" from the perspective of the learner. *Learn Instr*. 2023;**84**:101718. https://doi.org/10.1016/j.learninstruc.2022.101718.
2. Cai Z, Gui Y, Mao P, Wang Z, Hao X, Fan X, et al. The effect of feedback on academic achievement in technology-rich learning environments (TREs): A meta-analytic review. *Educ Res Rev*. 2023;**39**:100521. https://doi.org/10.1016/j.edurev.2023.100521.
3. Petancevski EL, Inns J, Fransen J, Impellizzeri FM. The effect of augmented feedback on the performance and learning of gross motor and sport-specific skills: A systematic review. *Psychol Sport Exerc*. 2022;**63**:102277. https://doi.org/10.1016/j.psychsport.2022.102277.
4. Muhammad AAA, Kamel AR, Abdel Tawab AA. [The Impact of Corrective Feedback in the E-Learning based on Anchored Learning on Developing Some technological concepts among Educational Technology Students]. *Fayoum Univ J Educ Psychol Sci*. 2019;**12**(1):85–122. Arabic. https://doi.org/10.21608/jfust.2019.82850.
5. Cheon SH, Reeve J, Song YG. Recommending goals and supporting needs: An intervention to help physical education teachers communicate their expectations while supporting students' psychological needs. *Psychol Sport Exerc*. 2019;**41**:107–18. https://doi.org/10.1016/j.psychsport.2018.12.008.
6. Hasan MM, Mosleh OA, Hammad F. The Impact of the Method of Teaching the Mediator Different Speed and Mental Training to Teach Some of the Offensive Skills for Beginners in Handball. *Indian J Public Health Res Dev*. 2019;**10**(12):1375. https://doi.org/10.37506/v10/i12/2019/ijphrd/192563.
7. Dunlosky J, Rawson KA, Marsh EJ, Nathan MJ, Willingham DT. Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology. *Psychol Sci Public Interest*. 2013;**14**(1):4–58. [PubMed ID: 26173288]. https://doi.org/10.1177/1529100612453266.
8. Asy OO, Azdeen MKA, Yousef SO. [The effect of using mind map teaching strategy in Cognitive Achievement and retention and acquisition of some offensive handball skills]. *Journal of Sports Science Applications*. 2019;**5**(102):65–92. Arabic. https://doi.org/10.21608/jaar.2019.84005.
9. Muhammad Ammar S. [Using Uprising Strategy in Teaching History for Developing Productive Thinking Skills and Engagement In Learning for Primary School Students]. *J Educ Assoc Soc Stud*. 2021;**18**(133):223–94. Arabic. https://doi.org/10.21608/pjas.2021.217039.
10. Thompson SK. Sample Size for Estimating Multinomial Proportions. *Am Stat*. 1987;**41**(1):42. https://doi.org/10.2307/2684318.
11. Abdel Rahim MMT. [Visual learning and its impact on teaching some basketball skills in a physical education lesson for secondary school students]. *Sci J Phys Educ Sports Sci*. 2021;**25**(1):69–91. Arabic. https://doi.org/10.21608/sjes.2021.260960.
12. Salah El-Din AA. [The effect of the guided discovery teaching method on some basketball skills for middle school students]. *Sci J Phys Educ Sports Sci*. 2020;**24**(21):115–35. Arabic. https://doi.org/10.21608/sjes.2020.261992.
13. Salama Saber A, Elsayed Abdelhamid Sorour K, Mohamed Almutaher H, Haitham Fouad Ibrahim Alrifai M. [Impact of the use of intensive training on the performance level of the Basketball dribbling skill]. *Sci J Phys Educ Sci*. 2021;**27**(27):112–30. Arabic. https://doi.org/10.21608/amps.2021.271993.
14. Yassan Hassan Marzouk E, Gamal Abdel Nasser H. [A Recommended Program for Overcoming Learning Plateau with the Non-Preferred Arm and its Effects on the Dribbling in basketball for Students at Faculty of Physical Education in Tanta]. *Sci J Phys Educ Sci*. 2022;**27**(31):565–89. Arabic. https://doi.org/10.21608/amps.2021.275119.
15. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. New York: Lawrence Erlbaum Associates; 1988. https://doi.org/10.4324/9780203771587.
16. Zhou Y, Shao W, Wang L. Effects of Feedback on Students' Motor Skill Learning in Physical Education: A Systematic Review. *Int J Environ Res Public Health*. 2021;**18**(12):6281. [PubMed ID: 34200657]. [PubMed Central ID: PMC8296044]. https://doi.org/10.3390/ijerph18126281.
17. Bays PM, Wolpert DM. Computational principles of sensorimotor control that minimize uncertainty and variability. *J Physiol*. 2007;**578**(Pt 2):387–96. [PubMed ID: 17008369]. [PubMed Central ID: PMC2075158]. https://doi.org/10.1113/jphysiol.2006.120121.
18. Wolpert DM, Diedrichsen J, Flanagan JR. Principles of sensorimotor learning. *Nat Rev Neurosci*. 2011;**12**(12):739–51. [PubMed ID: 22033537]. https://doi.org/10.1038/nrn3112.
19. Wolpert DM, Ghahramani Z, Flanagan JR. Perspectives and problems in motor learning. *Trends Cogn Sci*. 2001;**5**(11):487–94. [PubMed ID: 11684481]. https://doi.org/10.1016/s1364-6613(00)01773-3.
20. Ernst MO, Bulthoff HH. Merging the senses into a robust percept. *Trends Cogn Sci*. 2004;**8**(4):162–9. [PubMed ID: 15050512]. https://doi.org/10.1016/j.tics.2004.02.002.
21. Sigrist R, Rauter G, Riener R, Wolf P. Augmented visual, auditory, haptic, and multimodal feedback in motor learning: a review. *Psychon Bull Rev*. 2013;**20**(1):21–53. [PubMed ID: 23132605]. https://doi.org/10.3758/s13423-012-0333-8.
22. Olteanu M, Oancea BM, Badau D. Improving Effectiveness of Basketball Free Throws through the Implementation of Technologies in the Technical Training Process. *Appl Sci*. 2023;**13**(4):2650. https://doi.org/10.3390/app13042650.
23. Truong C, Ruffino C, Crognier A, Paizis C, Crognier L, Papaxanthis C. Error-based and reinforcement learning in basketball free throw shooting. *Sci Rep*. 2023;**13**(1):499. [PubMed ID: 36627301]. [PubMed Central ID: PMC9832021]. https://doi.org/10.1038/s41598-022-26568-2.
24. Taha MM, Al-Jaafreh OJ, Al-Homran BAI. [The Effect of Using Visual Feedback on Learning some Basic Basketball Skills]. *Dirasat: Educ Sci*. 2022;**49**(4):308–21. Arabic. https://doi.org/10.35516/edu.v49i4.3342.
25. El Badry Shaaban H, Madkour AA. [Impact of video backed feedback on learning some fencing skills of Physical Education Boys' College in Alexandria]. *Sci J Phys Educ Sports*. 2022;**19**(19):107–35. Arabic. https://doi.org/10.21608/jphalex.2022.247950.