10.61882/aassjournal.1550 Video summary on YouTube Infographic summary on LinkedIn

Ann Appl Sport Sci 13(4): e1550, 2025.
e-ISSN: 2322-4479; p-ISSN: 2476-4981

ORIGINAL ARTICLE

The Impact of Jesko's Strategy with Sequential Exercises on Learning the Skill of Dribbling in Basketball

[1]Ahmed Amer Abdulhussain, [1]Omar Waleed Abdulkareem*, [1]Halah Sinan Atiyah, [2]Omar Hussain Jaber, [3]Maysaa Ridha Ghanim, [1]Ahmed Hashim Hammood, [4]Yasser Mohammed Saleh

[1]University of Baghdad, College of Physical Education and Sport Sciences, Baghdad, Iraq.
[2]University of Al-Iraqia, Division of Psychological Guidance, Baghdad, Iraq.
[3]University of Baghdad, College of Physical Education and Sport Sciences for Girls, Baghdad, Iraq.
[4]University of Al-Iraqia, College of Medicine, Baghdad, Iraq.
***. Corresponding Author: Omar Waleed Abdulkareem**; **E-mail:** omar.w@cope.uobaghdad.edu.iq

Submitted March 06, 2025;
Accepted June 23, 2025.

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KEYWORDS
Jesko's Strategy, Sequential Exercise, Random Exercise, Basketball Patting Skill.

ABSTRACT

Background. Teaching strategies motivate students and focus on them within the educational process, emphasizing teamwork to foster collaboration and collective learning. **Objectives.** The present study employed the Jesko method to enhance the learning process by encouraging learners to take an active role in educational activities, with students working together in groups. **Methods.** A 2 × 2 factorial design was employed to randomly assign equal groups of 48 male and female students to develop approaches to learning dribbling in basketball. Two sequential training approaches were implemented during a single educational unit to ensure skill mastery. One experimental group used Jesko's strategy with the sequential method, and another used the order-style sequential method. A third experimental group applied the Jesko randomized method, while the fourth used the order-style randomized method. **Results.** Significant differences were observed between groups in all post-tests ($p < 0.001$). Test 1 revealed that Group C achieved the greatest mean improvement ($M = 13.33$), significantly outperforming the other groups ($p < 0.001$). Test 2 similarly showed that Group C experienced the greatest improvement ($M = 13.42$), with statistically significant advantages over the other groups ($p < 0.001$). In Test 3, Group C again outperformed all others ($M = 13.50$), with Group B showing the lowest scores. **Conclusion.** The study highlights the effectiveness of the Jesco strategy in learning skills, supported by testing, and suggests ways to advance sustainable development goals within the learning process.

INTRODUCTION

The field of physical education and sports science is experiencing rapid growth due to technological advancements and the increased application of motor learning principles and modern educational theories. This development calls for the adoption of more effective and appropriate teaching methods to enhance students' skill performance (1, 2). Learning motor skills, such as dribbling in basketball, is a key component that requires systematic planning based on a clear understanding of the stages of skill acquisition as demonstrated by motor learning models like Schmidt and Lee's (3) and Gentile's (4).

Among the new strategies recently introduced in educational settings, the Jesko strategy stands out as a model of collaborative learning centered on teamwork, intrinsic motivation, and active engagement with the learning environment (5). Research confirms that adopting such strategies enhances students' motivation, engagement, and social and cognitive skills (6, 7). Jesko is based on a dynamic approach to motor decision-making, supported by real-time performance analysis tools and indicators of adaptation to defensive pressure, in line with contextual learning models in sports (8, 9).

Dribbling in basketball is a complex skill that demands neuromuscular coordination, motor control, and quick decision-making under pressure (10). Recent research has demonstrated that utilizing educational software, motor analysis, and artificial intelligence techniques can significantly enhance the acquisition of this skill (11, 12). For example, Liu and colleagues (13) developed training models based on motor pathway optimization using deep learning, enabling learners to transition smoothly between different dribbling patterns.

Despite significant progress in motor learning theories, some educational institutions still rely on the Command Style, which emphasizes demonstrating skills stereotypically through the teacher. This approach limits opportunities for creative interaction and restricts students' motor autonomy (14). Therefore, it is necessary to compare the effectiveness of modern strategies, such as Jesko, with traditional methods to enhance the learning of basketball skills, particularly complex skills like dribbling.

A systematic review of over 60 studies on cooperative learning revealed that the Jesko strategy was among the most effective methods for enhancing cognitive and skill achievement, as well as boosting students' self-efficacy (15). A longitudinal study involving more than 4,600 students also demonstrated the strategy's positive impact on developing self-regulation and intrinsic motivation for mathematical learning (16).

Based on the above, this study aims to compare the effect of the Jesko strategy and the traditional coaching method on learning dribbling skills in basketball among high school students, using a theoretical framework founded on the principles of kinesthetic learning and modern skill acquisition models. The expected results aim to provide practical recommendations for enhancing sports teaching methods in alignment with global trends in teaching sports skills.

MATERIALS AND METHODS

Study Design. The experimental method employed a two-factor (2 x 2) design with equal groups randomly assigned to prevent potential differences among sample members. This method is optimal for achieving more realistic and accurate results compared to other approaches, and it also allows investigation of more than one independent variable.

Participants. The research community was deliberately selected from fourth-year middle school students at Al-Din High School in Baghdad, comprising 120 male and female students, represented by five individuals, which accounts for 2.59% of the total research community, as shown in Table 1.

Forty-eight male and female students were selected from Al-Din High School in Baghdad. The research sample was divided equally into four experimental groups, each consisting of 12 students, representing 40% of the total research population. Sample homogeneity was measured for the variables of height, weight, and age as shown in Table 2.

Table 1. Research the community and its sample.

People	Total Number	Excluded student	Number of sample members
(a) Gesco//Sequential	24	12	12 / Group 1
(b) Order/Serial	24	12	12 / Group 2
(c) Jesko/Random	25	13	12 / Group 3
(d) Order/Random	24	12	12 / Group 4
(e) Excluded	23	11	12 / Exploratory experience
Total	120	60	60

Table 2. Normal distribution of samples.

Variables	Mean (E.G.)	S.D.	Mean (C.G.)	Skewness
Length (cm)	1.49	2.43	1.48	0.462
Mass (kg)	41.46	2.14	41.00	0.317
Age (year)	14.17	0.52	14.00	0.229

E.G.: Experimental group; C.G.: Control group; S.D.: Standard deviation.

To assess whether the sample size was suitable for the research problem, a one-way analysis of variance (ANOVA) was conducted for the four groups. According to statistical assumptions, the effect size was large (0.8), with a significance level (P) of 0.05, and the desired power was 0.80. It was noted that the ideal sample size should be 84, meaning 21 male and female students per group. Therefore, the sample size used might be smaller than what was statistically recommended. However, these numbers were based on the available number of students, and due to logistical constraints, efforts were made to balance the groups for clearer data, as shown in Table 3.

Table 3. Equivalence of the four experimental groups in the skill of patting.

Variables	Sources	Sum of squares	Degree of freedom	Average squares	F	P-value
First Test	Between groups	4.19	3	1.64	0.79	0.509
	Inside groups	84.67	44	1.92		
	Total	89.59	47			
Second Test	Between groups	4.42	3	1.47	0.72	0.546
	Inside groups	90.00	44	2.05		
	Total	94.42	47			
Third Test	Between groups	5.00	3	1.67	0.82	0.491
	Inside groups	89.33	44	2.03		
	Total	94.33	47			

Training Protocol. Due to the limited time in the Ministry of Education's curriculum for teaching basic basketball skills, one key skill identified is dribbling. Three tests were selected: the High Test, which measures high tapping skill by calculating the time in seconds from the start signal to when the player reaches the finish line, recorded to the nearest hundredth of a second; the Tapping from Change of Direction Test, which assesses tapping performance while changing direction, measuring the time from the start signal to crossing the finish line at point (B); and the Rotation Test, which evaluates ball control, with the player's performance time recorded in seconds, and ball loss monitored by deducting attempts or time. These tests aim to identify strengths and weaknesses, as well as evaluate the effectiveness of the techniques used. The first is the High Test, designed to measure high dribbling skill, as shown in Figure 1. The second test involved evasive maneuvers, which involved changing direction, as shown in Figure 2. The third test was the rotation test, as depicted in Figure 3.

The exploratory experiment was conducted on Sunday, October 1, 2023. Regarding the tests and lesson management, an educational unit was implemented as an exploratory experiment using the method of sequential exercises in evasion with the imperative method on 12 students from the excluded group (E) on October 4, 2023. Additionally, another educational unit was implemented as an exploratory experiment using the sequential exercises method in evasion with the imperative method on October 05, 2023. Finally, an educational unit was implemented as an exploratory experiment using the random exercises method in evasion with the imperative method on October 11, 2023.

The pre-test of dribbling skills was conducted on four experimental research groups on October 18, 2023, with the research sample. The performance of the sample in both skills was recorded on video. The recordings were then transferred to CDs for distribution to three assessors, who are experienced basketball professors. This process was used to evaluate the research sample's dribbling skills. After collecting data from the three evaluators, the average of the three attempts for each learner was calculated. The mean scores from the three evaluators were then used to determine the final result for each trial. The agreement rate among the evaluators reached 85%, indicating good reliability for the tests.

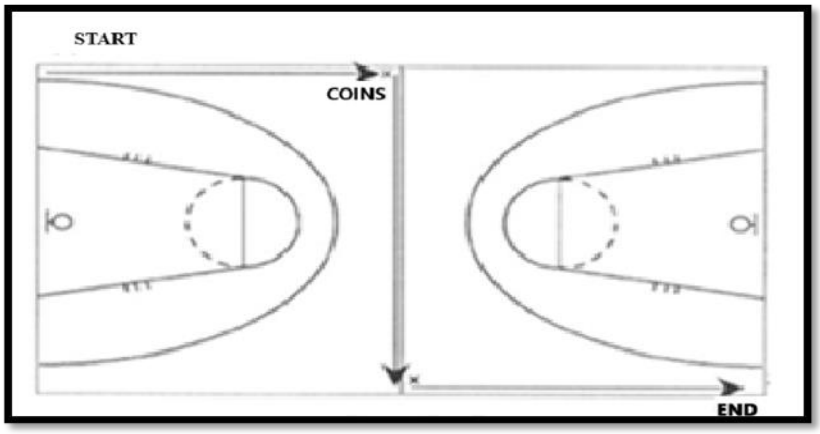

Figure 1. Show test-1 the high dribbling skill.

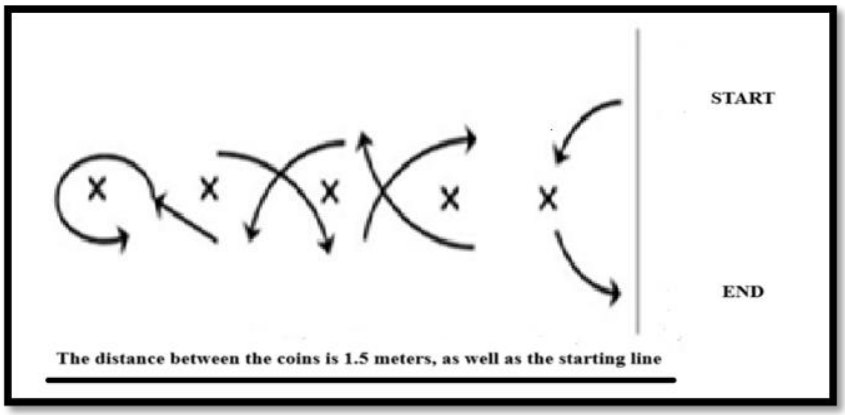

Figure 2. Show test-2 changing direction.

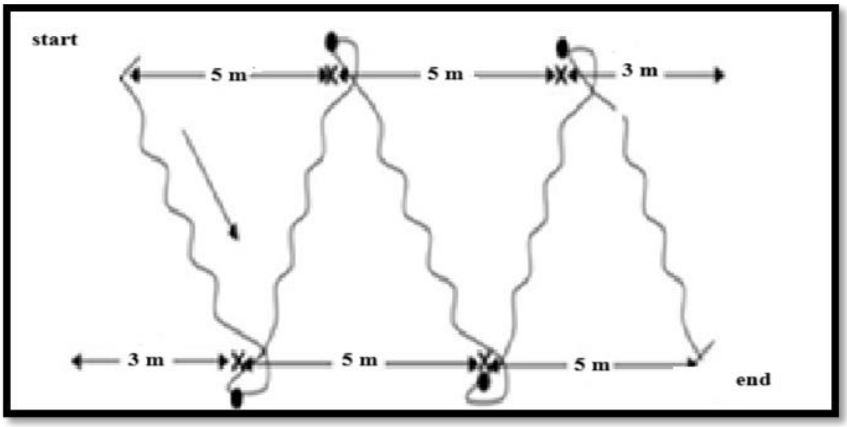

Figure 3. Show test-3 the rotation.

Four educational curricula were developed to teach the skill of dribbling in basketball. These included two curricula based on the sequential exercises method, where exercises are applied during a single educational unit until a satisfactory level of proficiency is achieved. One of these used Jesko's strategy in the first experimental group, while the second employed the imperative method. The other two curricula were based on the random exercises method, which involves the application of multiple dribbling exercises within a single educational unit.

This was done once using Jesko's strategy, as represented by the third experimental group, and another time using the imperative method, as represented by the fourth experimental group. The two educational curricula (the first and third), which employed Jesko's strategy, included the steps of the strategy; they were designed according to Jesko's strategy to teach the skill of ducking in basketball. The first and third experimental groups were divided into three subgroups of four students each within the original group. In total, one experimental group consisted of 12 students, divided into three small groups of four students each. Moreover, the results of the daily test were announced on the bulletin board, rewarding the best student and the best group as encouragement for the students and groups, and urging the spirit of competition among members of the same group and other groups. Work started on October 16, 2023, and ended on December 1, 2023, with an educational unit per week, covering seven units of learning the drum skill. The lessons were divided as shown in Table 4.

The post-test of the basketball dribbling skill was conducted on the four experimental research groups on December 1, 2023, after the participants had completed the educational curricula and the conditions were prepared to be similar to those of the pre-tests, in order to obtain accurate results.

Table 4. Time divisions of one educational unit in the Jesco strategy.

Sections	Time	Details
Preparatory Department	8 minutes	Introduction: 2 minutes
		Warm-up: 3 minutes
		Physical exercise: 3 minutes
Main Section	20 min	Educational aspect: 8 minutes
		Practical side: 12 minutes divided into four exercises
Concluding Section	12 minutes	The mini-game: 3 minutes
		Instant Collection: 7 minutes
		Departure: 2 minutes

Total time: 40 minutes per educational unit.

Data Analyses. The data in this study were analyzed using SPSS software. Twenty-six statistical descriptions—such as mean and standard deviation—were used to provide an overview of the participants' performance on the pre- and post-tests. To evaluate the study's hypotheses, inferential statistical methods were employed. Initially, a one-way ANOVA test was performed on the pre-test results to ensure that the groups were statistically equivalent at the start. After confirming group homogeneity, we used ANCOVA to analyze the post-test data, taking into account any differences between the pre-test and post-test. This procedure allowed for a more accurate assessment of the effects of the interventions. The level of significance was set at $p < 0.05$.

RESULTS

An analysis of covariance (ANCOVA) was performed to examine differences among the four experimental groups in the post-test results for high dribbling skill, using the pre-test results as a covariate. As shown in Table 5, the covariate (the first pre-test) had no statistically significant effect, with $F(1, 41) = 0.040$ and a p-value of 0.842, indicating that pre-test performance did not significantly influence the post-test outcomes.

On the other hand, the results indicated that there were statistically significant differences among the four experimental groups in their performance on the post-test of the high dribbling skill, where the value of $F(3, 41) = 20.570$, with $p<0.001$, suggesting that the educational method used in each group significantly affected performance.

The sum of squares between groups was 61.711, with a mean square of 20.570, showing a strong effect size relative to the error (mean square error = 0.707).

Analyzing the results of the dimensional comparisons test using the Least Significant Difference (LSD) test to identify differences between means after the ANCOVA test showed statistical significance. The results indicated significant differences among some of the four experimental groups in performance on the post-test of high dribbling skill.

Table 5. ANCOVA for post-test 1 (high dribbling), controlling for pre-test 1.

Source	Type III SS	Df	Mean Square	F-value	p-value
Pre-Test (Covariate)	0.029	1	0.029	0.040	0.842
Between Groups (Experimental)	61.711	3	20.570	20.570	<0.001*
Error	30.388	41	0.707		
Corrected Total	94.479	45			

*: Significant at p<0.05; SS: Sum of squares; Df: Degree of freedom.

The first group outperformed the second group by (+2.5833) points, a statistically significant difference at the significance level ($p < 0.001$), and the first group also outperformed the fourth group by (+2.3333) points (p=0.000). In contrast, the difference between the first and third groups was not statistically significant (difference = +0.3333, $p = 0.331$), indicating that the performance levels of these two groups were comparable. The results also showed a clear superiority of the third group over the fourth group, with a statistically significant difference (+2.0000) ($p < 0.0001$). The third group outperformed the second group by a significant difference of (-2.2500) points (p=0.0000), reinforcing the strength of the third group's performance. The difference between the second and fourth groups was not statistically significant ($p = 0.465$). These results indicate that the first and third groups performed significantly better than the second and fourth groups, demonstrating the effectiveness of the training programs used in these two groups, as shown in Table 6.

The results shown in Table 7 indicate that the effect of the pre-test was not statistically significant, with $F = 0.001$ at the significance level ($p = 0.970$). This suggests that the differences in dimensional performance are not due to tribal variations in this skill.

Regarding the main effect of the experimental groups, the results indicated statistically significant differences among the groups, with an F value of 37.783 at a significance level of (p=0.000), which is highly significant (p<0.05). This indicates that the different training programs the groups followed had a notable impact on their performance in the second-dimensional test.

The mean square value between the groups (Mean Square = 20.062) is compared to the mean square error (Mean Square Error = 0.531), indicating a relatively large effect size for the experimental treatment.

Based on these results, it can be concluded that the differences between the groups after implementing the educational programs were genuine and statistically significant.

Table 8 presents the results of the dimensional comparisons test, using the LSD test to identify differences between the four groups after implementing the educational programs, specifically in the second dimensional test of dodging with deception skill.

The comparison between group 1 and group 2 revealed statistically significant differences favoring group 1, with an average difference of +2.2500 at a significance level (p<0.001). Additionally, Group 1 outperformed Group 4 with a significant difference (+1.8333, $p < 0.001$). When comparing group 1 to group 3, the differences were not statistically significant ($p = 0.164$), indicating similar performance levels between these two groups.

Regarding group 2, it clearly showed higher performance compared to both group 3 and group 4, as the differences were statistically significant in favor of group 2, with an average negative difference of -2.6667 ($p < 0.001$). In contrast, differences involving group 4 were not statistically significant ($p = 0.164$).

The results also showed that group 3 statistically significantly outperformed group 4, with a difference of +2.2500 ($p < 0.001$).

Table 6. Post hoc comparisons for post-test 1.

(I) Group	Mean Diff (I–J)	SE	p	95% CI
1 vs 2	+2.5833	0.3394	<0.001*	[1.899, 3.267]
1 vs 3	+0.3333	0.3394	0.331	[–0.351, 1.017]
1 vs 4	+2.3333	0.3394	<0.001*	[1.649, 3.017]
2 vs 3	–2.2500	0.3394	<0.001*	[–2.934, –1.566]
2 vs 4	–0.2500	0.3394	0.465	[–0.934, 0.434]
3 vs 4	+2.0000	0.3394	<0.001*	[1.316, 2.684]

*: Significant at p<0.05; SE: Standard error; CI: Confidence interval.

Table 7. ANCOVA for post-test 2 (evasion), controlling for pre-test 2.

Source	Type III SS	Df	Mean Square	F-value	p-value
Pre-Test (Covariate)	0.001	1	0.001	85.667	0.970
Between Groups (Experimental)	60.187	3	20.062	37.783	<0.001*
Error	22.833	41	0.531		
Corrected Total	85.667	45			

*: Significant at p<0.05; SS: Sum of squares; Df: Degree of freedom.

Table 8. Post hoc comparisons for post-test 2.

(I) Group	Mean Diff (I–J)	SE	p	95% CI
1 vs 2	+2.2500	0.2941	<0.001*	[1.657, 2.843]
1 vs 3	–0.4167	0.2941	0.164	[–1.009, 0.176]
1 vs 4	+1.8333	0.2941	<0.001*	[1.241, 2.426]
2 vs 3	–2.6667	0.2941	<0.001*	[–3.259, –2.074]
2 vs 4	–0.4167	0.2941	0.164	[–1.009, 0.176]
3 vs 4	+2.2500	0.2941	<0.001*	[1.657, 2.843]

*: Significant at p<0.05; SE: Standard error; CI: Confidence interval.

These results indicate that Group 3 was the top performer in the deception test, followed by Group 1, Group 4, and then Group 2. This reflects the effectiveness of the educational program given to the third group compared to the other programs.

Table 9 shows the results of the ANCOVA for the third-dimensional rotational skill test, after controlling for the third pre-test as a covariate.

The results showed that the effect of the covariate (pre-test) was not statistically significant, $F = 1.429$, $p = 0.238$, indicating that the pre-test results did not influence the differences between the groups in the post-test.

Alternatively, the analysis of variance revealed significant differences among the four experimental groups in the post-test results ($F = 48.417$, $p < 0.001$). This indicates a clear impact of the different training programs on improving the participants' rotational skills.

These results indicate that the performance difference between the groups is not due to the pre-test, but rather to the type of program each group used, highlighting the effectiveness of one or more specific educational programs.

Table 10 presents the LSD test results among the four experimental groups after different training programs, to assess participants' performance in the rotation skill during the third post-test.

The results showed statistically significant differences between Group 1 and Group 2, with a difference of +2.7500 in favor of Group 1 ($p < 0.001$). A similar significant difference was observed between group 1 and group 4, with a difference of +2.3333, also favoring group 1 ($p < 0.001$). Conversely, the difference between group 1 and group 3 was negative at -1.0833, indicating that group 3 was superior ($p = 0.006$).

Table 9. ANCOVA for post-test 3 (rotation), controlling for pre-test 3.

Source	Type III SS	Df	Mean Square	F-value	p-value
Pre-Test (Covariate)	1.206	1	1.206	1.429	0.238
Between Groups (Experimental)	122.598	3	40.866	48.417	0.000*
Error	22.833	41	0.531		
Corrected Total	85.667	45			

*: Significant at p<0.05; SS: Sum of squares; Df: Degree of freedom.

Table 10. Post hoc comparisons for post-test 3.

(I) Group	Mean Diff (I–J)	SE	p	95% CI
1 vs 2	+2.7500	0.3769	<0.001*	[1.990, 3.510]
1 vs 3	–1.0833	0.3769	0.006	[–1.843, –0.324]
1 vs 4	+2.3333	0.3769	<0.001*	[1.574, 3.093]
2 vs 3	–3.8333	0.3769	<0.001*	[–4.593, –3.074]
2 vs 4	–0.4167	0.3769	0.275	[–1.176, 0.343]
3 vs 4	+3.4167	0.3769	<0.001*	[2.657, 4.176]

*: Significant at p<0.05; SE: Standard error; CI: Confidence interval.

Moreover, the differences between group 2 and both group 3 (-3.8333) and group 4 (-0.4167) favored groups 3 and 4, respectively, but the difference with group 4 was not statistically significant (p = 0.275). The difference between group 3 and group 4 (+3.4167) favored group 3 (p<0.001).

These results indicate that Group 3 demonstrated the greatest improvement in performance compared to all other groups, followed by Group 1 and Group 4, while Group 2 showed the lowest performance after using the educational programs.

Figure 4 displays the F-values for the three post-tests (high dribbling, dribbling, and spinning), while statistically controlling for pre-test scores. The results reveal significant differences between the experimental groups in all three skills, with F-values of 20.57 for high dribbling, 37.78 for dribbling, and 48.42 for spinning (all p < 0.001). The strongest effect was seen in the spinning skill, indicating a greater impact of the strategies used on this test.

These results support the hypothesis that the instructional method applied to the third group was more effective than traditional methods in developing the rotation skill.

The significant differences between the groups, especially in favor of the third group, suggest that the educational program has value and can be applied to similar groups of learners.

DISCUSSION

The study found significant differences in post-test scores among the four groups, with the third group, which used the JESCO strategy with randomized exercises, showing the most favorable results. The ANCOVA results showed that both the JESCO strategy and the command approach help improve dribbling skills, but JESCO with randomization yields the best results.

One explanation for these results is rooted in the theoretical basis of motor learning. According to Herz (17), skill proficiency in sports requires structured, repeated practice under conditions that promote retention and transfer. The JESCO strategy supported this through learner-centered engagement, where students acted as both recipients and contributors to the instructional process. This approach helped them deepen their conceptual understanding and procedural fluency (18).

From a mechanistic perspective, the improved performance seen in the JESCO-random group can be attributed to the cognitive challenge caused by randomized learning schedules. This variation encourages better problem-solving and motor adaptation, consistent with the principles of contextual interference theory (19). Additionally, sequencing and randomization enable learners to face diverse task demands, strengthening learning consolidation and reducing performance plateaus (20).

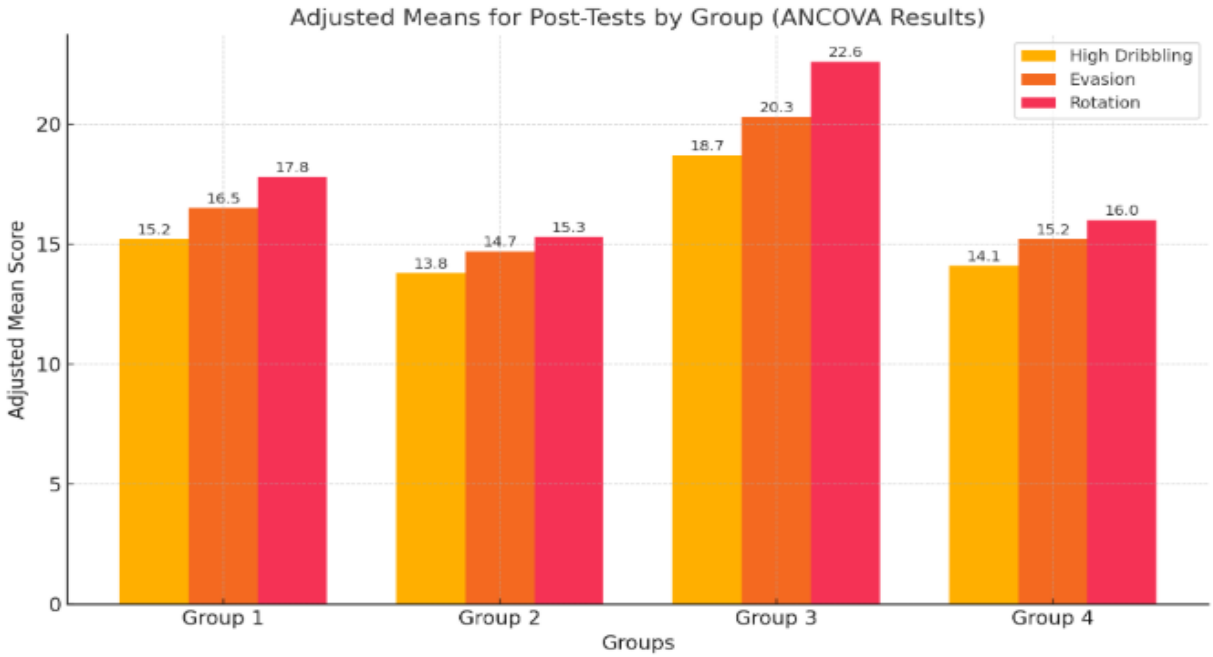

Figure 4. Show adjusted means of post-test scores using ANCOVA (controlling for pre-test performance).

The strategy also aligns with modern pedagogical frameworks focused on group-based and cooperative learning, such as the Jigsaw model, which has been proven to improve both working memory engagement and task performance (20). Within this framework, learners assumed leadership roles, negotiated meaning, and provided peer feedback, key elements of the JESCO method that foster both cognitive and social growth (21).

Another important mechanism is attentional focus. JESCO's learner-driven activities promote external focus (e.g., on outcomes and goals rather than movements), which is shown to speed up motor learning and retention (22). Additionally, as shown by Liu and Hodgins (23), when skill acquisition is supported by variability and guided autonomy, it yields stronger and more transferable motor patterns, particularly in complex sports such as basketball.

The post hoc analysis confirmed that Group 3 significantly outperformed other groups in both the second and third post-tests, highlighting the advantage of combining learner-centered strategies with randomized practice. These findings suggest that combining effective instructional strategies (like JESCO) with scientifically supported training modalities (such as randomized scheduling) can greatly improve motor skill development in physical education settings.

The practical implications are significant. Incorporating such strategies into school curricula can lead to greater engagement, quicker achievement of proficiency, and more autonomy for learners (24). Additionally, the use of combined physical and cognitive training, as part of the JESCO method, aligns with recent research advocating for integrated interventions for overall development (25).

However, the study has limitations. It used a 2x2 factorial design with small groups (n=12), and while attempts were made to control variables, future research should test larger and more diverse populations. Additionally, the long-term retention of skills after the intervention was not evaluated; therefore, follow-up studies are needed to assess sustainability.

It is essential to emphasize the significance of these findings in local and Arab educational settings, where many curricula still rely on rote memorization and a command-based teaching approach. Introducing the Jesco strategy, which encourages collaborative thinking and independence, could revolutionize motor skill development in schools, particularly in light of recent trends in curriculum reform in Arab countries. Therefore, the study suggests that

ministries of education and training schools incorporate active, strategy-based approaches, such as Jesco, into their physical education teacher training programs, while also instructing them on how to apply these methods in classroom settings with limited resources.

CONCLUSION

It was observed that the Jesco strategy, combined with sequential and randomized training methods, had a significant impact on the acquisition of basketball dribbling skills among the research sample. Interestingly, different levels of impact on learning were seen among the four groups studied. The Jesco strategy clearly influenced the active learning process, placing the student at the center of learning with a strong leadership role within the group. It also demonstrated that providing positive feedback plays a crucial role in enhancing performance. These results recommend using this strategy in physical education for beginners learning skills, given its significant impact and key role in mastering performance.

APPLICABLE REMARKS

- Using Jesko's strategy to encourage students to work together in groups to learn skills, analyze problems, and integrate into the group.
- Using this strategy helps improve the student's ability to interact with the dodging game.
- Engaging in the learning process and collaborating with group members to complete the lesson tasks.
- Students here work cooperatively and support one another, providing them with strong motivation that makes the educational material engaging and enjoyable, while also improving both their academic and social skills.
- Providing the learner (leader) and learners with various types of correctives, along with encouraging and reinforcing feedback for performance.

ACKNOWLEDGMENTS

The authors thank the faculty of the College of Physical Education and Sports Science for Girls at the University of Baghdad for providing facilities during this research.

AUTHORS' CONTRIBUTIONS

Study concept and design: Ahmed Amer Abdulhussain, Omar Waleed Abdulkareem, Halah Sinan Atiyah, Omar Hussain Jaber. Acquisition of data: Omar Hussain Jaber, Maysaa Ridha Ghanim, Ahmed Hashim Hammood. Analysis and interpretation of data: Ahmed Amer Abdulhussain, Yasser Mohammed Saleh, Omar Waleed Abdulkareem. Drafting the manuscript: Halah Sinan Atiyah, Ahmed Hashim Hammood, Maysaa Ridha Ghanim. Critical revision of the manuscript for important intellectual content: Ahmed Amer Abdulhussain, Omar Waleed Abdulkareem, Yasser Mohammed Saleh, Omar Hussain Jaber. Statistical analysis: Yasser Mohammed Saleh, Ahmed Hashim Hammood. Administrative, technical, and material support: Maysaa Ridha Ghanim, Omar Hussain Jaber. Study supervision: Ahmed Amer Abdulhussain, Omar Waleed Abdulkareem.

CONFLICT OF INTEREST

The authors state that they have no conflicts of interest that could have influenced the work reported in this paper.

FINANCIAL DISCLOSURE

The authors declare that there is no conflict of interest or financial support related to this research. No funding was received from any organization for the conduct of the study or the preparation of this manuscript. All authors confirm that they have no financial relationships with any commercial entity that could potentially bias the results of this study.

FUNDING/SUPPORT

No funding sources reported.

ETHICAL CONSIDERATION

The research is conducted in accordance with the ethical guidelines of the College of Physical Education and Sports Science for Girls, University of Baghdad.

ROLE OF THE SPONSOR

The funding organizations are public institutions and had no role in the design and conduct of the study; in the collection, management, and analysis of the data; or in the preparation, review, and approval of the manuscript.

ARTIFICIAL INTELLIGENCE (AI) USE

The authors declare that no artificial intelligence (AI) tools, algorithms, or software were used in the

conception, design, analysis, interpretation of data, or the drafting of this manuscript. The authors conducted all work without the assistance of AI-based tools or systems.

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