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The Effect of Using the Pentagram Strategy as a Modern Tool for Teaching the Chest Pass and Layup Skills in Basketball for Juniors Under 14 Years Old

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Abstract

The purpose of this study was to investigate the effect of Pentagram strategy as a contemporary approach in teaching chest pass and layup skills of basketball among under 14 years junior students. The researcher employed experimental method with equivalent groups (experimental and control) with pre-test and post-test. The sample of the study was composed of 16 players from the specialized school of Youth and Sports Ministry that was divided into two groups. The experimental group received a program of 24 instruction units, three per week, using the Pentagram strategy where the skills are divided into five dimensions and developed progressively. The findings indicated that significant differences at chest pass and layup skills were found in favor of the experimental group, and Pentagram intervention program gives also a positive contribute to juniors's skill performance. The researcher suggested that this plan should be adopted in the educational programs of basic motor skills since it positively affects active thinking, cooperation work and the students' self-motivation.

Keyword: Pentagram Strategy, Chest Pass, Layup Skill, Youth Basketball Training.

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

Introduction

Basketball is one of the most popular sports, characterized by excitement, competitiveness, and collective performance, as it is both a team-based and spectator-oriented game. The complex nature of basketball, with its high physical, technical, tactical, and mental demands, as well as the rapid collective and individual movements required, necessitates the development of multiple skills and physical abilities to achieve a high level of performance, especially during match situations and their associated pressures. Scoring more points than the opposing team, which largely depends on shooting skills, is one of the decisive factors in winning games. This requires continuous development at both the player and team levels, achieved through improving physical, technical, and tactical attributes. Experts and specialists in the field continuously work on developing these aspects through research and studies aimed at advancing the game. Basketball includes many fundamental skills that begin with beginners learning dribbling in its various forms as the foundational stage, followed by passing and then shooting, which together contribute to the integration of motor and cognitive processes.

A lot of attention and research has been on novice players as they signify the backbone of future players. Motor learning in this age is a key factor to aid beginners in comprehending and acquire the skills they must learn. Several learning methods, strategies have been proposed; the Pentagram method is one of the recent ones. This approach seeks to yield a new model of learning for students, and initiate the teaching of advanced level thinking skill like planning, monitoring, evaluating etc. It depends on posing so-called 'specific learning tasks' that give learners the motivation to go out explore and find information on their own. Its efficacy is based on organizing material through a good framework using judiciously chosen sources. The approach leads learners incrementally through one stage to another with end points being defined learning outcomes.

Pentagram strategy can motivate learners to solve problems with the real situation and prepare the various tools/equipment, organize individuals/groups to stimulate thinking autonomously/interacting together in cooperative learning in kind experience. It uses critical thinking and enables students to gain new knowledge and relate it to the world around them. It mirrors actual experience, limits misinterpretation and increases efficient learning by connecting information to the learner emotionally, psychologically, and intellectually. Therefore, learning should not be just supplying knowledge or information; rather it should help learners gain a profound understanding and high-order thinking.

This study aims to analyze the effect of the Pentagram strategy on developing basic basketball skills among beginners. The strategy is based on dividing training into five main components, which may include ball control, shooting, passing, movement without the ball, and defense, with the goal of providing comprehensive training that improves both individual and team performance. Basketball, as a team sport, requires mastering a set of fundamental skills such as passing, dribbling, and shooting, which form the basis for

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
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https://jcope.uobaghdad.edu.iq

developing players' technical and performance abilities, particularly in the early stages of learning.

Accordingly, it has become necessary to adopt modern teaching strategies that enhance learning efficiency and motivate learners. Among these strategies, the Pentagram strategy stands out as it relies on teamwork within small groups, which contributes to developing cooperation, shared thinking, and improved motor performance. Several studies have indicated that employing this strategy in sports may have an effective impact on learning motor skills in a more interactive and in-depth manner (Al-Zubaidi, 2020).

The main objective of this research is to identify the effect of the Pentagram strategy on improving basic basketball skills among beginners. The Pentagram is an innovative training method based on dividing exercises into five aspects or dimensions aimed at improving athletic performance. The research seeks to measure the effectiveness of this strategy in developing fundamental skills such as dribbling, passing, and shooting.

It is necessary to establish the methods and strategies for sports learning that will increase learner's performance, in particularly at younger ages requiring a solid foundation of skill-learned in different sports, especially basketball. Specialists have therefore attempted to provide with schools, colleges and universities a variety of educational apparatus and teaching methods which they hope will save time, work and money in learning. A significant development was detected in certain basic skills, chest passing, bounce passing and lay-up shooting especially through the researcher watching of the competitions accompanying Iraqi premier basketball league for juniors and youth. This deficiency, in combination with learners not being able to improve their skills moving from one level to the next and compete against professional foreign players has hampered transferring certain tactical plans demanded by coaches and beating defensive opponents. That has had a negative impact on the general level of Iraqi basketball and the performances of the teams." So, employing the Pentagram system should aid in developing these foundational skills.

Research Questions

- What is the effect of the Pentagram strategy on learning basic basketball skills (chest pass and layup) among beginners?

Objectives of the Study

1. To identify the Pentagram strategy in teaching some basic basketball skills to beginners.
2. To determine the effect of exercises using the Pentagram strategy on learning some basic basketball skills among beginners.

Research Hypotheses

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
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https://jcope.uobaghdad.edu.iq

1. There are no statistically significant differences between the pre- and post-tests of the experimental group in developing passing and layup skills among beginner basketball players.
2. There are no statistically significant differences between the pre- and post-tests of the experimental group in developing passing and layup skills among basketball players.
3. There are no statistically significant differences in the post-tests between the experimental groups in developing passing and layup skills among beginner basketball players.
4. There are no statistically significant differences between the pre- and post-tests in learning some basic basketball skills.

Justification and Importance of the Research

1. Skill performance learning: presenting an integrated educational model that contributes to accelerating the acquisition of basic skills.
2. Enhancing teamwork: exercises focusing on tactical aspects help improve coordination among players.
3. Developing training methods: benefiting from diverse models of physical and tactical skill exercises.

Basic basketball skills for beginners, particularly passing and layup shooting, are essential for developing an effective offensive team performance. Players must master these skills with accuracy and speed, as they are key to linking skills together and enabling players to assess game situations and make appropriate decisions during matches. This study seeks to improve these skills through appropriate training exercises.

Research Scope

- Human field: Players of the Specialized Basketball School under 14 years old.
- Time field: From 8/2/2025 to 14/4/2025.
- Spatial field: Specialized Basketball School.

Methodology

The nature of the study variables determines the research method used; therefore, the experimental method was considered the most appropriate for addressing the research problem. The experimental approach is regarded as the most suitable method for identifying cause–effect relationships and represents one of the most valid approaches for solving several scientific problems in a practical manner (Allawi & Kamel, 1999, p. 217). Accordingly, the researcher adopted the experimental method using the equivalent groups design with pre- and post-tests, as it

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
P-ISSN: 2073-6452, E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

suits the nature of the research problem. The results were compared before and after implementing the educational program on the study sample.

Population and Sample

The available research population means the part of the total population which he is able to observe and from which he can draw his sample directly (i.e., without intermediate samplings). The sample needs to be drawn from a small and well-defined group of people that were chosen for reasons other than for the study that is being conducted and should have similar characteristics as well as possess attributes of the research population (Al-Tamimi, 2015, p. 222).

The study sample was used for this study which included players of billiard of Al-Said Sports Club under 14 years of age. The sample was composed of 16 players, who were divided into (8) control and (8) experimental groups within the total population of this age group in the 13 clubs. The research elected the sample according to its adequacy to offer the information required for the objectives of this study. The experimental group received training based on the Pentagram method.

Table 1. Descriptive Statistical Data and Sample Homogeneity

Variable	Statistic	Chest Pass	Layup
Mean	Arithmetic Mean	9.1875	0.09140
Median	Median	9.0000	0.08700
Std. Deviation	Standard Deviation	1.32759	0.011730
Skewness	Skewness	0.9780	0.5190
Std. Error of Skewness	Standard Error of Skewness	0.5640	0.5640
Minimum	Minimum Score	8.00	0.06890
Maximum	Maximum Score	12.00	0.11680

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
P-ISSN: 2073-6452, E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table 2. Differences in Means, Standard Deviations, and t-Value for Pre-Tests Between the Two Groups for Equivalence

Test	Unit	Groups	Mean	Std. Deviation	Mean Difference	Std. Error	Calculated t-value	Sig. Value	Result
Chest Pass	Score	Experimental Group	9.1250	1.24642	-0.125	0.686280	0.1820	0.8580	Not Significant
		Control Group	9.2500	1.48805					
Layup	Score	Experimental Group	0.0936130	0.01193740	0.0044250	0.00595430	0.7430	0.4700	Not Significant
		Control Group	0.0891880	0.01187990					

Significance is considered when $p < 0.05$ at a degree of freedom (14).

Table 3. Agreement of Experts and Specialists on the Tests

No.	Test	Total Experts	Disagreeing Experts	Agreeing Experts	Percentage	Significance
1	Chest Pass	11	0	11	100%	Significant
2	Layup	11	1	10	90.91%	Significant

Agreement is considered significant when it reaches 75% or higher.

Table 4. Validity and Reliability of the Tests and the Self-Validity Coefficient (Square Root of Reliability)

No.	Test	Test–Retest Reliability	Sig. Value	Self-Validity	Objectivity	Significance
1	Chest Pass	0.983**	0.000	0.99	1.00	Significant
2	Layup	0.663**	0.005	0.81	0.989**	Significant

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
P-ISSN: 2073-6452, E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Objectivity is similar to reliability in terms of the consistency or similarity of results, but it also considers differences among evaluators to ensure obtaining the same outcomes (Ameer, 1997). Objectivity refers to the absence of variation among assessors in judging a particular issue or subject (Bahi, 2012). It also means that test results are not influenced by the personal factors of the evaluator, such as mood or subjective judgment (Khalifa & Al-Adawi, 2002, p. 193).

The researcher determined the objectivity of the physical and motor tests by recording the scores assigned by two judges and analyzing the results statistically using Pearson's simple correlation coefficient between the scores of the first and second judges. When comparing the calculated values, it was found that all tests were significant at a significance level of (0.05), indicating that the physical and motor tests selected for the study were objective. The cognitive test also demonstrated high objectivity as it is less susceptible to bias.

Data Collection, Tools, and Devices Used

1. Arabic and foreign sources and references.
2. Personal interviews with experts and specialists.
3. Information from the international internet network.
4. Observation and analysis.
5. Laptop computer (HP).
6. One electronic stopwatch (Flott).
7. Basketball sports halls.
8. Basketballs (10).
9. Measuring tape (50 meters).
10. One iPad device (Apple).
11. Whistle.
12. Cones.
13. Marker indicators.
14. Poles.

Skill Tests

First: Chest Pass Test (Baranov & Alexey, 2005)
Name of the test: Chest Pass Test
Purpose: To measure the player's ability to perform the chest pass accurately toward a fixed target.
Equipment:

- Basketball.

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
P-ISSN: 2073-6452, E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

- Flat wall.
- Adhesive tape to mark the distance (usually 2.4–3 meters from the wall).
- Stopwatch.

Procedures

1. The player stands at a specified distance from the wall (approximately 2.4–3 meters).
2. The player performs chest passes toward the wall with maximum possible speed and accuracy.
3. The player attempts to hit a mark on the wall at chest level.
4. The player performs as many passes as possible within a specified time (30 seconds to one minute).

Evaluation

- The number of successful passes hitting the target within the specified time is counted.
- Performance is recorded based on accuracy and speed.
  (The illustration shows the chest pass test in basketball, where the player passes the ball toward a specific target on the wall.)

Second: Lay-up Shooting Test (source not accurately specified)
Purpose: To evaluate the player's accuracy and speed in performing lay-up shots while in motion.
Equipment: Basketball, stopwatch, basketball hoop.

Procedures

1. The player stands at or slightly behind the free-throw line.
2. The player starts running toward the basket while dribbling.
3. Upon approaching the basket, the player performs a lay-up shot using the backboard.
4. The attempt is repeated from both the right and left sides.

Evaluation

- The number of successful lay-up shots is calculated from a set number of attempts (e.g., 10 attempts).
- Speed and accuracy of performance are also assessed.

Pilot Study

The pilot study is a smaller version of the main experiment, which is easier to carry out by keeping its properties as similar to those in the primary experiment as we can and we try to take

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
P-ISSN: 2073-6452, E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

advantage on it (Wajih Mahjoub & Ahmed Badr, 2002, p. # 35). The researcher, aided by the assistant's group with him, performed the pilot on Saturday 1/2/2025 at 3 p.m., i.e., at the Ministry of Youth and Sports courts and halls, for players who were not part of the main study sample. The pilot sample was made of four players under 14. The aims of the pilot study include:

- Determining the time required to conduct the tests.
- Assessing the readiness and performance of the assisting team.
- Identifying potential difficulties during implementation and addressing them.
- Ensuring the suitability of the equipment used in the tests.
- Identifying possible errors that may occur.

Pre-tests

The researcher conducted the pre-tests on the research sample by applying the skill tests to determine and record the results of each test using data recording forms. These tests were conducted on Saturday, 8/2/2025, at 3:00 p.m., at the courts and halls of the Ministry of Youth and Sports.

Main Experiment

Applying the educational strategy Pentagram to help develop offensive skills for research sample (young players under 14 years old of Specialized Basketball School). 24 instructional units The training program was comprised 24 learning units which were delivered at the pace of three units a week for about 8 weeks.

The staff chose the training sessions that covered offensive skills considered for the research. Following the warm-up performed by technical staff, the researcher gave the exercises to be applied with a sample of eight athletes under change master coach direction for main part of training session. The exercises were the main element of the training session, which lasted 30–35 minutes. Training took place every Friday at 9 a.m., Monday at 3 p.m., and Wednesday at 3:00 p.m.

Application of the Pentagram Educational Strategy in Basketball

So, the Pentagram strategy method was applied with Al-Said Club players under 14 years in order to learn the below basketball skills (chest pass, bounce pass and low dribbling, high dribbling, lay-up shooting) by means of dividing each skill into five basic one; and every part of those training exercises were practiced separately per day during a week.

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
P-ISSN: 2073-6452, E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Post-tests

The purpose of conducting the post-tests was to identify and measure the differences resulting from the training program by applying the same pre-tests to the research sample while maintaining conditions similar to those of the pre-tests as much as possible. The post-tests were conducted on Monday, 14/4/2025, at 3:00 p.m., at the courts and halls of the Ministry of Youth and Sports.

Statistical Methods

The researcher used the Statistical Package for the Social Sciences (SPSS) along with several statistical procedures to obtain the results, including:

1. Arithmetic mean.
2. Standard deviation.
3. Pearson's simple correlation coefficient.
4. One-sample t-test.
5. Percentage.

Results

Table 1. Means and Standard Deviations of the Pre- and Post-Tests (Chest Pass) for the Experimental Group

Statistical Parameters	Unit	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD
Chest Pass	Score	9.125	1.24	14.62	1.40

Table 2. Differences in Means, Standard Deviations, and t-Value for the Pre- and Post-Tests (Chest Pass) for the Experimental Group

Variable	Unit	Mean Difference	SD of Differences	Std. Error	Calculated t-value	Sig. Value	Significance
Chest Pass	Score	5.50	1.309	0.462	11.881	0.000	Significant

Significance is considered at $p < 0.05$ with a degree of freedom (7).

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
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https://jcope.uobaghdad.edu.iq

Table 3. Means and Standard Deviations of the Pre- and Post-Tests (Layup) for the Experimental Group

Statistical Parameters	Unit	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD
Layup	Score/Second	0.093	0.011	0.129	0.0114

Table 4. Differences in Means, Standard Deviations, and t-Value for the Pre- and Post-Tests (Layup) for the Experimental Group

Variable	Unit	Mean Difference	SD of Differences	Std. Error	Calculated t-value	Sig. Value	Significance
Layup	Score/Second	0.0358	0.014	0.005	7.083	0.000	Significant

Significance is considered at $p < 0.05$ with a degree of freedom (7).

Table 5. Means and Standard Deviations of the Pre- and Post-Tests (Chest Pass) for the Control Group

Statistical Parameters	Unit	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD
Chest Pass	Score	9.25	1.48	11.87	1.885

Table 6. Differences in Means, Standard Deviations, and t-Value for the Pre- and Post-Tests (Chest Pass) for the Control Group

Variable	Unit	Mean Difference	SD of Differences	Std. Error	Calculated t-value	Sig. Value	Significance
Chest Pass	Score	2.62	1.84	0.65	4.02	0.005	Significant

Significance is considered at $p < 0.05$ with a degree of freedom (7).

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
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https://jcope.uobaghdad.edu.iq

Table 7. Means and Standard Deviations of the Pre- and Post-Tests (Layup) for the Control Group

Statistical Parameters	Unit	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD
Layup	Score/Second	0.089	0.011	0.106	0.0155

Table 8. Differences in Means, Standard Deviations, and t-Value for the Pre- and Post-Tests (Layup) for the Control Group

Variable	Unit	Mean Difference	SD of Differences	Std. Error	Calculated t-value	Sig. Value	Significance
Layup	Score/Second	0.01710	0.0223	0.007	2.167	0.06	Not Significant

Significance is considered at $p < 0.05$ with a degree of freedom (7).

Table 9. Differences in Means, Standard Deviations, and t-Value Between the Post-Tests of the Two Groups in the Chest Pass Variable

Variable	Unit	Groups	Mean	SD	Mean Difference	Std. Error	Calculated t-value	Sig. Value	Result
Chest Pass	Score	Experimental Group	14.6250	1.40789	2.75	0.831	3.306	0.006	Significant
		Control Group	11.8750	1.88509					

Significance is considered at $p < 0.05$ with a degree of freedom (14).

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
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https://jcope.uobaghdad.edu.iq

Table 10. Differences in Means, Standard Deviations, and t-Value Between the Post-Tests of the Two Groups in the Layup Variable

Variable	Unit	Groups	Mean	SD	Mean Difference	Std. Error	Calculated t-value	Sig. Value	Result
Layup	Score/Second	Experimental Group	0.1294870	0.01141760	0.023	0.0068	3.397	0.004	Significant
		Control Group	0.1062880	0.01558230					

Significance is considered at $p < 0.05$ with a degree of freedom (14).

Discussion

The following section shows analysis of results on the study where it discusses impact of training program on basketball skill variables. Pre- and post-tests were used to collect data from the experimental group and control group under studied skills; chest pass, and layup. We first examine the conditional factor structure separately in each group, and then we compare the two groups at post-test interpreting statistical significance.

The results of the statistical analysis demonstrated that there was statistically significant difference between the pre-and post-test levels of the experimental group in chest in-and pass skill, since calculated t value reached (11.881) at a significance level (< 0.05), and mean increased from (9.12 to 14.62). This gain is greater than that for the control group (with a t-value of 4.020 and mean post test score of 11.87), so that the increase in efficacy to the chest pass by it, was significantly below average.

The enhancement is largely associated with the structure of the training programme which utilised to a great extent, the Pentagram approach as a constructivist model involving stages such as activation, construction, representation, extension and evaluation. These stages ensured progressive cognitive–motor development of the skill from activating prior knowledge to representing the skill through applied situations, extending across various contexts and finally assessing individually and collaboratively.

This result is in agreement with Alduais (2022), who found that the use of Pentagram model was effective for enhancing students' skill understanding in sport activities, and it's considered to be significant when comparing between children learning with strategy and being taught by using a conventional method. The author suspects that the increase proportion experienced by the experimental group for chest pass test were higher than those of control group, which suggests to say that education programme based on Penatagramal strategy contributed significant enhancement in sports skills development. The educational modules comprised evidence based

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
P-ISSN: 2073-6452, E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

interventions in line with the strategy for promoting skill acquisition and maintenance of performance (Al-Rubaie & Amin, 2010).

Moreover, as we learn from the OPTIMAL theory of motor learning (Wulf and Lewthwaite, 2016), providing a motivating condition to practice such as feedback, engagement in the task or focus on the effect triggers significant gain in performance. This was indeed evident in the current study where experiential learning units with diverse chest pass drills were incorporated. Magill and Anderson (2021) also indicated that learning the basics of team sports such as passing into this section requires controlled practice sessions consisting of organized repetition and corrective feedback to adjust motor patterns and performance.

From the applicability point of view (the effect size), indeed, as becoming clear above, the huge variance between pre-test and post-test averages for experimental group with great statistically significant demonstrate that the treatment was not only sound statistically but also applied in real sense. Hamid (2021) also adduced that structuring the educative process in stages increases understanding and improves the rate at which learners are able to transfer skills into game-situations from practice sessions, a trend corroborated by the present results of enhanced accuracy and efficiency for chest pass. The literature (Al-Hayek & Hussein, 2021) reveals that the chest pass is one of the most commonly used passes in basketball since it is perceived to be fast and compatible with the offensive ready position. The exercises in the instructional program were scientifically designed and had much to improve the chest pass among experimental class against control class.

Results showed that there were significant differences in the pre- and post-test of lay-up for both groups, experimental group (t=-7.083, md=0.035) and control group (t=-2.167, md=0.017). The layup technique is regarded as one of the most difficult to master for young players, as it involves tightly controlled coordination between footwork, jumping, arm movement, visual focus, and essential decision-making during a fraction of a second at high rates of speed. This course gradually and interactively covered these elements at its levels.

The greater improvement in the experimental group relative to control group post intervention, also demonstrates that the educational package introduced based upon the Pentagram FT strategy has helped develop layup performance significantly. The drills were systematically organized scientifically and consistent with the strategy in the competition, which has resulted in significant improvement of lay-up skill performance among experimental group. An evident improvement in scoring accuracy was found after the training among the pre-test results, and there were significantly differences (< 0.05) between two groups during post-test.

This is likely due to the programming's emphasis on shooting skills (hand placement, release angle, shot repetition), and prioritization of biomechanically sound movement patterns. At the "construction" phase, a visual motor model of the skill was presented as well as breaking it

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
P-ISSN: 2073-6452, E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

into segments that allowed learners to connect these phases with the final jump. Learning from viewing correct models and through proscribed repetition, Salman & Al-Kazim (2015) argued, enables learners to generate accurate mental representations of movement – which supports future mastery.

During the "representation" phase, participants practiced the task at increasing difficulty without a defender and with yielding [counter balance]). This step corresponds to Adnan (2007) who remarks that simple competitive activities increase motivation and lower motor anxiety especially in skills with visual-motor coordination. The development that was done by the experimental group was not only very fast, but also stable and accurate, mostly due to the direct feedback methods (individual and collective) applied, as previously indicated by Magill & Anderson (2021), who concluded that shooting requires correction strategies based on error detection and outcome-based learning.

Furthermore, cooperative learning factors supported the quality of performance involving small groups who alternated between player, observer and judge roles that helped in promoting motor perception. Al-Muhaisen (2020) pointed out that learner engagement and critical thinking about one's own work improve when learners are involved in assessment and feedback. This enhancement was not only statistically significant but also may have represented a practically important effect, given that change in performance implies an increase on playing level which is likely to be noticed under actual game conditions (e.g., for fast breaks or close-range scores).

Shooting is the final stage of offensive process in basketball and all team skills are designed to develop scoring opportunities (Hamid, 2004). Aside from that, an enhanced layup shooting certainly contributes to a team´s success and scoring in crucial game situations. Given that the contrasts are statistically significant (≤ 0.05), it is unlikely that these effects were obtained by chance. It also provides structuring skill exercises, changing training drills, and the number of attempts with the supportive training equipment to make it interesting and motivating and reduce boredom in practicing for younger players (Adnan, 2007; Salman & Al-Kazim, 2015).

Conclusions

1. The Pentagram program was found to be very successful in enhancing the quality of all five test items (chest pass, bounce pass, high dribbling, low dribbling and layup) tested between the experimental group vs. control group.
2. All of the trained skills with Pentagram reached significant differences between pre- and post-tests in favor of the post-test measures.

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
P-ISSN: 2073-6452, E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Recommendations

1. Applying the Pentagram strategy as a general method of instruction physical skills especially in team sports, since it has an obvious effect on developing skill performance in young children.
2. Development of curricula and practical training programs through constructivist and Interactive teaching rather than traditional repeating model.
3. Generalizing the intervention to other age categories and performance levels (e.g., students of secondary school or females) as well as to other sports (e.g., handball, volleyball), which allows greater generalization and verification of its effectiveness in various populations.

Journal of Physical Education
Volume 38– Issue (1) – 2026 Open Access
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https://jcope.uobaghdad.edu.iq

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