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The Effect of Generative Learning Strategies on the Clarity of the Badminton Clear Shot Skill of Al-Para Badminton Players

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Abstract: *The educational and sports field has recently witnessed remarkable development with the use of modern teaching methods to improve the learning process and to improve the skill performance of the learners. One such important strategies is the generative learning, which has been described as an effective learning strategy that involves the learner in the process of learning without depending on the teacher or others. This is done by making connections with what the learner already knows and not just giving him a new piece of information to memorize. This contributes to developing active thinking, deepening understanding, improving performance ability, and developing motor skills. Para-badminton is one of the racket sports included in the Paralympic Games, enabling individuals with physical disabilities to participate in sports activities. This participation extends beyond mere practice to include achieving success at both the local and international levels. It is also considered a modified version of badminton for able-bodied individuals. The researcher adopted an experimental approach with a two-group design (experimental and control) using pre- and post-tests. The research population consisted of the national para-badminton team players, numbering twelve (12) players. Due to the limited size of the population and the feasibility of including all members in the research procedures, the researcher adopted a total inclusion approach in sample selection. All twelve (12) para-badminton players were included in the research sample, representing 100% of the population. The research problem is defined by answering the following question: Does the generative learning strategy have a statistically significant effect on developing the defensive and offensive clear shot skills of para-badminton players compared to the traditional teaching method?*

Keywords: *Generative Learning Strategy, Clear Shot, Para-Badminton Players.*

Introduction

The educational process has witnessed remarkable development in recent decades because of rapid scientific and technological advancements. This has pushed those in charge of education to rethink traditional methods and approach such as rote learning or memorization that will lead to the failure of learner's creativity and excellence as passive learners.

Given these changes, there is the need to adapt education to the modern ways and keep up with the times through the implementation of modern education strategies. These strategies should develop thinking skills and motivate learners to interact and be creative in learning settings so that it is more practical for them to gain knowledge through learning activity and critical thinking rather than just listening and receiving.(Grice, 2026)

In addition, the use of learner-centered learning strategies helps to enhance academic performance as well as higher order thinking skills, and promotes independence, problem-solving and decision making—factors which meet the needs of modern education.

Therefore, it has become essential for educational institutions and technical staff to adopt these modern strategies, given their positive impact on developing the educational process and achieving more efficient and higher-quality learning outcomes.(Hashimoto & Toda, 2012) To achieve this, it became necessary to adopt modern educational strategies that contribute to the development of skill performance and help learners understand the requirements of motor skills and comprehend their stages.

Among the modern educational strategies that have garnered the attention of researchers in the fields of education and sports is the generative learning strategy:

The Generative Learning Strategy:(Blomqvist et al., 2001)

This is an educational approach that relies on engaging the learner in generating knowledge independently by connecting new information to their existing experiences, rather than simply imparting it through rote learning.

This contributes to developing active thinking, deepening understanding, and improving the ability to perform motor skills.

This strategy also provides learners with opportunities to interact positively with learning situations, enhancing their motivation to learn and increasing the effectiveness of the educational process. When this strategy is implemented, its benefits will be significant, enabling learners to interact with each other as well as with the educators. This creates a collaborative dynamic that fosters a deeper understanding of concepts and makes the learning process more enjoyable and creative.

The Basic Steps of the Generative Learning Strategy:(Hassan El-Gizawy, 2015)

- Introduction: Uncovering learners' prior knowledge through a dialogical discussion.
- Meaning Generation: The learner works to deduce and generate new meanings based on their prior knowledge.
- Challenging Perceptions: Discussing new ideas and testing them against the learner's existing perceptions.
- Application: Using learned concepts to solve new problems.

The Clear Shot(Ali & Siong, 2023)

- The clear shot is defined as a high, long shot that sends the shuttlecock in an arc to land near the back line of the opponent's court (close to the baseline). There are two types:
- Defensive Clear: Track: The shuttlecock is sent in a very high trajectory (high clear).
- Objective: To gain as much time as possible, allowing the player to return to the center of the court and regain their balance after being under pressure from the opponent.

1. **Attacking Clear: Track:** The shuttlecock's trajectory is flatter and faster than the previous type, so that it barely passes over the opponent's racket.

- Objective: To surprise the opponent and quickly push them back to win a point or force a weak or ineffective response. The main difference between the two lies in height and speed; the defensive shot gives the initiating player "breathing time," while the offensive shot deprives the opponent of "reaction time." It is also considered one of the fundamental shots that a player relies on to reorganize the game and control the court. It is also a transitional defensive shot in which the shuttlecock is directed with a high and deep arc towards the back line of the opponent's court. Its objectives can be summarized as follows:

2. **Objectives of the Spade Shot:(Blomqvist et al., 2000)**
   - Pushing the opponent back to the back of the court.
   - Gaining time to reposition themselves.
   - Breaking the opponent's attacking rhythm.
   - Creating an opportunity to build a subsequent attack.
3. **Player Classes:** The Badminton World Federation classifies players according to the type of disability to ensure fairness in competitions, as follows: a- Wheelchair Classes: These are of two types:(Kim, 2017)
   - Wheelchair users of type 1 (WH1): These players have greater impairment in balance and trunk control compared to other types of disability, and their movement within the wheelchair is also limited.
   - Wheelchair users of type 2 (WH2): These players have better trunk and arm control than the previous type, and their mobility is greater than (WH1).
   - Standing Classes (SL3): These players have a disability in one of the lower limbs with a clear impairment in movement, and they play on half a court.
   - Standing Classes (SL4): These players have a disability in the lower limbs but with better mobility than (SL3). B- Category (SU5): The disability is in the upper limbs, including an arm or shoulder impairment, and play is on a full-size court.
   - Short Stature Category (SH6): The same court rules are used for able-bodied athletes, with minor modifications.

Para-badminton: (Chen et al., 2025)

Para-badminton is a racket sport included in the Paralympic Games. It provides individuals with physical disabilities the opportunity to participate in sports activities, not only for participation but also for achieving success at both the local and international levels. It is considered a modified version of badminton for able-bodied athletes, where some rules and playing styles are adapted to suit the different abilities of players while maintaining the spirit of challenge and skill in the game.

Thanks to the official inclusion of Para-badminton in the Tokyo 2021 Paralympic Games by the Badminton World Federation. Para badminton has established itself on the international stage, gaining significant attention from sports and educational institutions due to its crucial role in developing physical and technical skills, as well as its effectiveness in promoting physical activity and overall health.

Research Significance:(Zhou et al., 2019)

The research is significant because: It highlights a modern educational strategy for learning and developing a fundamental badminton skill: the clear shot, both defensive and offensive. It explores the application of generative learning within the training environment for national para badminton players.

- It enriches the scientific and practical aspects of para badminton training.
- The generative learning strategy provides an innovative educational framework that encourages players to think creatively and generate individual solutions during training, thereby enhancing their understanding of the skill and boosting their self-confidence during play.

Research Problem:

Modern trends in physical education have witnessed a remarkable development in employing educational strategies based on activating the cognitive processes associated with motor performance. However, the application of these strategies in teaching basic skills to para badminton players remains limited, especially in individual sports that require high motor precision and neuromuscular coordination, such as badminton. After the national para badminton team returned from the Fazza International Championship, the fourth edition, held in the United Arab Emirates, and given that the researcher was the national team's coach, he undertook a comprehensive evaluation of the tournament's proceedings and the team's results to find a new strategy to implement. The problem can be summarized in answering the following question:

Does the generative learning strategy have a statistically significant effect on developing the defensive and offensive clear shot skill of the national para badminton team players compared to the traditional teaching method?

Research Objectives:

1. To identify the impact of the generative learning strategy on learning the shot-put skill (defensive and offensive) among the national para badminton team players.
2. To identify the impact of the generative learning strategy on the cognitive achievement related to the shot-put skill (defensive and offensive) among the national para badminton team players.

Research Scope:

1. Human Scope: Players of the national para badminton team
2. Time Scope: From January 15, 2023, to August 22, 2023
3. Location: The central training hall (Iraqi National Paralympic Committee Hall) in the Al-Banoq neighborhood of Baghdad Governorate.

Methodology

Methods should be described with sufficient details to allow others to replicate and build on the published results. Please note that the publication of your manuscript implies that you must make all materials, data, computer code, and protocols associated with the

publication available to readers. Please disclose at the submission stage any restrictions on the availability of materials or information. New methods and protocols should be described in detail while well-established methods can be briefly described and appropriately cited.

Research manuscripts reporting large datasets that are deposited in a publicly available database should specify where the data have been deposited and provide the relevant accession numbers. If the accession numbers have not yet been obtained at the time of submission, please state that they will be provided during review. They must be provided prior to publication.

Interventionary studies involving animals or humans, and other studies that require ethical approval, must list the authority that provided approval and the corresponding ethical approval code.

Research Methodology:

The researcher adopted the experimental method with a two-group equivalent design (experimental and control) using pre- and post-tests. This method was deemed the most suitable for addressing the research problem and controlling the variables involved in skill learning (the focus of the research).

Research Population and Sample:

Research Population:

The research population consisted of (12) players of the national para badminton team.

Research Sample: Due to the limited number of individuals in the population and the feasibility of including all of them in the research procedures, the researcher adopted a total inclusion approach in selecting the sample. All (12) players from the national para badminton team were included in the research sample. The statistical representation of the sample was (100%) of the total research population, which allowed for the application of the experimental procedures to all players to achieve the research objectives.

Group Distribution:

The sample was randomly divided into two equal groups.

- Experimental Group (5 players): underwent the "Generative Learning" strategy.
- Control Group (5 players): underwent the traditional curriculum taught by the coach.

Sample Homogeneity and Statistical Methods:

To ensure the accuracy of the results, the homogeneity of the sample members was verified in terms of the variables (age, height, weight) to guarantee the accuracy of the results and minimize variance.

The researcher performed the homogeneity process for the sample (the subject of the study) using the coefficient of variation, according to the following mathematical formula:(Promrit & Waijanya, 2019)

$$CV = \frac{SD}{\bar{X}} \times 100$$

Where:

- CV: Coefficient of Variance.
- SD: Standard Deviation of the Group.
- X: Mean of the Group.

The coefficient of variation is a measure of relative dispersion within a sample; "the closer the result is to (1%), the higher and more ideal the homogeneity, while if the value exceeds (30%), this indicates a lack of homogeneity in the sample and a dispersion of its capabilities."

Table 1: Means, standard deviations and coefficient of variation for the research variables (height, age and weight)

Variables	Units	Mean	Std	Coefficient of variation (%)	Homogeneity level
Height	Cm	160.1	4.65	2.9%	**Very homogeneous**
Age	Year	20.2	1.23	6.1%	**Very homogeneous**
Weight	Kg	65.1	5.20	8.0%	**Very homogeneous**

The research sample consisted of (12) players from the national para-badminton team, selected purposively. To describe the sample and ensure its homogeneity in some key variables (height, age, and body mass), the mean, standard deviation, and coefficient of variation were used.

The results showed that the mean height was (160.1 cm) with a standard deviation of (4.65 cm) and a coefficient of variation of (2.9%), while the mean age was (20.2 years) with a standard deviation of (1.23 years) and a coefficient of variation of (6.1%). The mean mass of the body was (65.1 kg) with standard deviation (5.20 kg) and coefficient of variance (80%). The coefficient variations for all the variables were below 10% which suggests high homogeneity among the sample members in the variables. The highest homogeneity was found with height, followed by age, and a relatively higher variance with body mass, but it was within statistically acceptable limits.

This homogeneity is an important factor concerning the similarity in the nature of the sample members in terms of influencing outside factors and individual differences, which lead to the accuracy in the results obtained and the credibility of the conclusions drawn in this research.

Equivalence of the Research Groups:

The researcher conducted a statistical equivalence process between the two groups (experimental and control) in the variables under investigation (defensive and offensive distance shots).

The methodological importance of this step lies in ensuring that all members of the research sample, numbering (12) Paralympic athletes, start from an equivalent skill level in the variables under investigation before the start of the training program. This ensures that any subsequent differences in performance will be attributed to the effect of the (generative) strategy and not to random differences between the two groups.

Table (2) shows the statistical results confirming the absence of statistically significant differences between the two groups in the pre-tests, which enhances the

reliability of the comparison results and confirms that any subsequent differences in the post-tests are because of the applied strategy.

Table 2: Equivalence of the two research groups in the variables under investigation

Variables	Control group (n=6)		Experimental group (n=6)		Calculated T value	Sig	Level of significance
	Mean	Std	Mean	Std			
Defensive distance strike	16.25	1.22	16.10	1.20	0.12	0.90	Non sig.
Attacking distance strike	15.20	1.12	15.30	1.10	0.15	0.88	Non sig.

Tools, Equipment, and Data Collection Methods:

To achieve the research objectives and ensure control over field variables, the researcher utilized a range of technical tools and resources, categorized as follows:

Tools and Equipment:

These are the tools used to prepare the learning environment, implement the educational units, and administer the performance tests:

- Play Environment: Two (2) badminton courts with standard international specifications, specifically designed for the research group.
- Specialized Equipment:
  i. Fifteen (15) Unix brand rackets.
  ii. Fifteen (15) natural feathers in a box of Unix brand, of Chinese origin.
  iii. Colored and adhesive tapes for marking court corners, and a metric measuring tape for adjusting legal distances.
- Organizational Tools:
  i. A form for recording the results of pre- and post-tests.
- Assistive Equipment
  i. Digital camera for performance documentation
  ii. 55-inch Samsung plasma screen

Data Collection Methods:

In accordance with the nature of the research, the researcher adopted a set of methods and tools that allow for obtaining accurate and objective data reflecting the change in the skill performance level of the sample group. The tools were chosen to suit the physical and kinetic characteristics of the players, as well as the nature of the skill (under investigation).

First/ Standardized Scientific Observation:

Scientific observation is one of the fundamental methods in research related to motor skills, as it enables the researcher to follow the actual performance of players while executing the skill in its natural environment.

The researcher relied on standardized observation through an observation form specifically designed to evaluate the technical aspects of the shuttlecock in badminton. This was a form that contained a series of kinetic markers for each stage of the performance of

the skill (ready position, movement of striking arm, timing of the shuttlecock strike, accuracy of directing the shuttlecock back of the court). Some of the expert judges used this form to guarantee the objectivity of the evaluation.(Brock & Liu, 2023)

Second/ Specialized Skill Tests:

The researcher used a set of skill tests, which assessed accuracy and efficiency of performance. Players were asked to complete a certain number of shots on designated parts of the field and the number of correct attempts that fit the criteria for the shot to be successful were counted.

Third/ Kinematic Analysis Using Video Recording:

Video recording was utilized to record the players' performance in the skill tests as kinematic analysis is important in skill studies. It is one of the most accurate ways to get quantitative and qualitative information about performance, giving accurate data about movement paths, joint angles and biomechanical changes. This enables them to compare actual movements with an ideal model and enhance their performance levels. This also allowed the performance to be repeated several times and the mastery of the finer details, such as the angle of the shot, the speed of the movement and the coordination of the various parts of the body. Apart from giving the scientific materials that can be used in the process of analysis, this method also helped in minimizing the risk of error in direct evaluation.

Fourth: Technical Performance Evaluation Form:(Tzetzis & Votsis, 2006)

The researcher had prepared an analytical evaluation form to assess the clear shot technical performance from a quality perspective. The skill was broken down into three major parts: preparatory, striking, and follow-through. The points were awarded to each phase on the basis of certain criteria, thereby enabling a more reliable evaluation of the level of technical skills of each player. The Badminton form has been checked by a panel of experts and professionals in Badminton to ensure scientific validity of the form before it was used in the field.

1. **Clear Shot Accuracy Test:(Saleh et al., 2024)**

A skill test was created to evaluate the skill level of Para-badminton players regarding the skill of the clear shot, which takes into consideration the needs of the player with physical disabilities.

- The player is at the back of his/her own half of the service court, and shoots at three target areas on the opponent's court. These areas are identified by the letters A, B and C and each area is identified as having a different level of challenge.
- The distance from the net to the end of each area is recorded accurately giving an objective measure of the level of challenge. Players can be administered the test while standing or sitting in a wheelchair.
- The results are recorded using a special form, with points for each shot. This test aims to evaluate accuracy, power, and control of the clear shot before and after the implementation of a training program or generative learning strategy.

Scientific Foundations of the Test:(Pardiman et al., 2018)

To scientifically confirm the strength of the powerhouse shot skill test, three main elements were considered:

1. **Validity:** The face and content validity of the test were verified by presenting it to a group of sports training and motor learning experts in badminton to assess its suitability for measuring the powerhouse shot skill and its level of difficulty for players.
2. **Reliability:** The test's reliability was measured by administering it twice to the same sample with an interval of (3–5) days. The correlation coefficient between the results of the two administrations was then calculated to ensure consistency of performance and stability of the measurements.
3. **Objectivity:** To ensure the objective of recording the results, independent judges were employed to monitor the players' performance and evaluate each shot according to the scoring system defined for the zones (A, B, C), with pre-agreed upon scoring criteria.

The generative learning process involves several stages:

- Activation Stage.
- Focus Stage.
- Generation Stage.
- Application Stage.

Testing the Spare Shot Skill in Badminton for AL-Para Badminton Players (Hastie et al., 2009)

Test Objective:

- To measure the player's accuracy in directing the defensive and offensive spare shot towards the backcourt of the badminton court.

Equipment Used:

- A regulation badminton court.
- A badminton racket.
- Practice shuttlecocks.
- Adhesive tape to mark target areas on the court.
- A score recorder.

Performance Procedure:

- The player performs two attempts before the start of the test, which do not count towards the evaluation score.
- The player stands in the backcourt of their own half of the court.
- The coach or assistant sends the shuttlecock to the player.
- The player performs the spare shot, attempting to deliver the shuttlecock to the backcourt of the opponent's court.
- The player performs (10) consecutive attempts (defensive) and (10) attempts (offensive).

Scoring:

- (3) points are awarded if the shuttlecock lands in the backcourt (A).
- (2) points are awarded if it lands in the backcourt (B).
- point is awarded if it lands in the middle of the court (C).
- points are awarded if it goes out of bounds or does not reach the opponent's half of the court.
- A maximum of (30) points is awarded for defensive shots and a maximum of (30) points for offensive shots.

Test Conditions:

- Use the same type of shuttlecock and racket for all players.
- Maintain a stable position for the player.
- Maintain a consistent method of delivering the shuttlecock by the assistant.
- Record the results immediately on a separate form for each skill.

When administering the test, the following must be considered:

- Adjust the player's position according to the type of disability.
- Allow sufficient rest between attempts.
- Use the same type of shuttlecock and racket for all players to ensure stability.
- Recording the performance for later motion analysis.

Pilot Study:

A pilot study is a preliminary study conducted by the researcher on a small sample before proceeding with the main research procedures. This ensures the effectiveness of the experimental design and the selection of the most appropriate tools and methods for the nature of the variables. The researcher carried out the pilot study on Wednesday, January 18th 2023 in the central hall of the Paralympic Committee in the Al-Banoq neighborhood in Baghdad, with a sample of three players of the Para-badminton sport. This pilot study was conducted to find out whether the skill tests employed in the measurement of distance shot are suitable, to make sure that instructions to conduct the tests are clear, to find the time needed to perform the tests and to find out if there are any obstacles or difficulty that the researcher will face on the main experiment. The pilot study was also aimed at verifying the equipment and tools used in the research, the efficiency of the support staff in recording the results and applying the test procedures correctly. The findings of the pilot study showed that the tests could be used properly with the research sample. It also made a minor adjustment in some of the organizational aspects in how the results are recorded and the order the tests were given. This enabled the researcher to set up suitable conditions for the main experiment to be conducted accurately and objectively.

1. **Main Experiment Procedures:**

   The following steps indicate the actual starting point of the strategy implementation: The steps below indicate the actual start point for the implementation of the strategy:

Introductory Unit: A preliminary learning unit was given to the sample to introduce them to the nature of the generative learning strategy.

Practical Activity: The participants practised with great intensity and purpose to apply the learning. The researcher emphasized that the atmosphere of excitement and engagement could be created to motivate learners to learn the performance, which can be seen in Table3.

Table 3: Distribution of training units according to the generative learning strategy

Week	Educational activity	Targeted skill	Training unit time
First	Mastering the offensive strike	Developing the technical foundations of attack	90 minutes
Second	Mastering the defensive strike	Developing the technical foundations of defense	90 minutes
Third	Applying generative strategies	Enhancing interaction and creative thinking	90 minutes
Fourth	Applying generative strategies	Deepening skills and practical application	90 minutes
Fifth	Comprehensive final assessment	Comprehensive analysis and scientific recommendations	90 minutes
Sixth	Comprehensive final assessment	Developing the technical foundations of attack	90 minutes

2. **Programming Completion:**

The training program concluded on Monday, March 6, 2023, after ensuring that all technical aspects of the distance shot skill (defensive and offensive) were covered, and that the fundamental principles of implementing the generative learning strategy were observed.

3. **Post-Test:**

After completing the components of the training program based on the generative learning strategy, the researcher conducted post-tests for the research sample (experimental and control groups) in the defensive and offensive distance shot skills on Wednesday, March 8, 2023.

4. **Statistical Methods:**

The researcher used the Statistical Package for the Social Sciences (SPSS) to conduct the statistical analyses.

Results and Discussion

Presentation and analysis of the pre- and post-test results for the distance shot skill for the control group:

Table 4: Means, standard deviations, calculated t-value, and type of significance in the pre- and post-tests for the distance shot skill for the control group

Variables	Pre-test		Post-test		Value T	Sig	Level of significance
	Mean	Std	Mean	Std			
Defensive distance strike	16.10	1.25	19.00	1.50	2.70	0.021	Sig.

Attacking distance strike	15.20	1.10	18.40	1.35	2.95	0.018	Sig.

The results show significant differences between the pre-test and post-test scores in the control group's skills, indicating limited improvement as a result of practice and repetition within the traditional method.

Presentation and Analysis of Pre- and Post-Test Results for the Distance Shot Skill in the Experimental Group:

Table 5: Means, Standard Deviations, Calculated T-value, and Type of Significance in the Pre- and Post-Tests of the Distance Shot Skill in the Experimental Group

Variables	**Pre-test**		**Post-test**		**Value T**	**Sig**	**Level of significance**
	Mean	Std	Mean	Std			
Defensive distance strike	16.20	1.20	24.50	1.30	5.45	0.000	Sig.
Attacking distance strike	15.30	1.12	23.80	1.20	5.10	0.001	Sig.

The results indicate a significant improvement in performance after implementing the generation strategy, with the experimental group recording higher means and larger t-values compared to the pre-test.

Presentation and Analysis of Post-Test Results for the Distance Shot Skill (Experimental and Control Groups):

Table 6: Means, Standard Deviations, Calculated T-Value, and Type of Significance in the Post-Tests for the Distance Shot Skill for the Experimental and Control Groups

Variables	**Control group (n=6)**		**Experimental group (n=6)**		**Value T**	**Sig**	**Level of significance**
	Mean	Std	Mean	Std			
Defensive distance strike	19.00	1.50	24.50	1.30	4.75	0.001	Sig.
Attacking distance strike	18.40	1.35	23.80	1.20	4.30	0.002	Sig.

The table shows statistically significant differences between the two groups, favoring the experimental group. This indicates the effectiveness of the generational strategy in developing motor skills compared to the traditional method.

Discussion

By extrapolating the results presented in Tables (4, 5, and 6), we observe a statistically significant improvement in the performance level of the (defensive and offensive) distance shot skill for both groups. However, the results clearly and strongly favor the experimental group. The researcher attributes this discrepancy to the following factors:

1. **Control Group:**

   The results in Table (4) show statistically significant differences between the pre-test and post-test for the control group in both the defensive and offensive distance shot skills. The (Sig) values were less than (0.05), indicating a significant

improvement in performance. This is attributed to practice and repetition within the traditional method.(Kh, 2024)

2. **Experimental Group:**

   The results in Table (5) indicate significant differences between the pre-test and post-test in favor of the post-test. The (T) values were high and the (Sig) values were less than (0.05), demonstrating the effectiveness of the generation strategy in improving skill performance.(Suh & Jeong, 2025)

3. **Comparison between the two groups:**

   Table (6) shows that there are statistically significant differences in the post-test between the two groups and in favor of the experimental group, which confirms that the generation strategy was more effective than the traditional method in developing the defensive and offensive dimension shot skills.(Guo et al., 2021; Ma et al., 2024; Ochor & Amasiatu, 2025)

Conclusions:

1. Using the generational strategy led to a significant improvement in the offensive and defensive shot skills of the experimental group compared to the control group.
2. The control group showed limited improvement because of the traditional method, but it was much less than the effect of the generational strategy.
3. The post-test results confirm that the differences between the two groups are statistically significant, which reinforces the credibility of the strategy's effect on improving skill performance.

References

Ali, S. K. B. S., & Siong, N. U. (2023). Effectiveness of a comprehensive module in improving serving skills and lob shots during badminton training. *Journal of Physical Education and Sport*, 23(5), 1130–1141.

Alsayigh, H. A., Athab, N. A., & Firas, M. (2017). The study of electrical activity of the triceps brachia muscle according to the chemical changes of Water Loss during Spike in Volleyball. *Journal of Global Pharma Technology*, 62.

Athab, N. A. (2019). An analytical study of cervical spine pain according to the mechanical indicators of the administrative work staff. *Indian Journal of Public Health*, 10(5), 1349.

Athab, N. A., & Alsayigh, H. A. (2021). *Rehabilitation of the wrist joint injury accordance of kinesiology variables* (Unpublished manuscript/report).

Athab, N. A., Hussein, W. R., & Ali, A. A. M. (2019). A Comparative Study for Movement of Sword Fencing Stabbed According to the Technical Programming in the Game of Fencing Wheelchairs Class B. *Indian Journal of Public Health*, 10(5), 1345.

Blomqvist, M., Luhtanen, P., & Laakso, L. (2000). Expert-novice differences in game performance and game understanding of youth badminton players. *European Journal of Physical Education*, 5(2), 208–219.

Blomqvist, M., Luhtanen, P., & Laakso, L. (2001). Comparison of two types of instruction in badminton. *European Journal of Physical Education*, 6(2), 139–155.

Brock, S. J., & Liu, H. (2023). An investigation of skills, tactical knowledge, and game performance transfer in badminton: A pickleball perspective. *International Journal of Physical Education, Sports and Health*, 10(5), 13–17.

Chen, M., Hongseanyatham, P., & Tasnaina, N. (2025). Development of Badminton High Clear Shot Training Program of Students Aged Between 8-10 Years. *International Journal of Sociologies and Anthropologies Science Reviews*, 5(2), 195–206.

Grice, T. (2026). *Badminton: Steps to success*. Human Kinetics.

Guo, S. Z., Mohamad, N. I., Zakaria, J., Yu, L., & Malek, N. F. A. (2021). Reliability and validity of badminton special speed training method toward success score and time perception predictive skills performance of badminton players. *Journal of Physics: Conference Series*, 1793(1), 012059.

Hashimoto, T., & Toda, M. (2012). A Research on Visual Analysis of Badminton for Skill Learning. *International Journal of Image, Graphics and Signal Processing*, 4(3), 1–8.

Hassan El-Gizawy, H. (2015). Effect of visual training on accuracy of attack shots performance in badminton. *Journal of Applied Sports Science*, 5(4), 36–45.

Hastie, P. A., Sinelnikov, O. A., & Guarino, A. J. (2009). The development of skill and tactical competencies during a season of badminton. *European Journal of Sport Science*, 9(3), 133–140.

Kh, B. I. (2024). Improving the technique of badminton sports training. *Экономика и Социум*, (3-1 (118)), 71–77.

Kim, I. (2017). Teaching badminton through play practice in physical education. *Journal of Physical Education, Recreation & Dance*, 88(8), 7–14.

Ma, S., Soh, K. G., Japar, S. B., Liu, C., Luo, S., Mai, Y., Wang, X., & Zhai, M. (2024). Effect of core strength training on the badminton player's performance: A systematic review & meta-analysis. *PLoS One*, 19(6), e0305116.

Ochor, D. C., & Amasiatu, A. N. (2025). The Impact of Eye-Hand Coordination on Badminton Skill Mastery Among Undergraduate Sports Science Students at the University of Port Harcourt. *Science*, 9, 100077.

Pardiman, P., Sugiharto, S., & RC, A. R. (2018). The Effects of Exercise & Coordination Eyes-Hand against Drop Shot Accuracy in Badminton Athletes. *Journal of Physical Education and Sports*, 7(1), 68–72.

Promrit, N., & Waijanya, S. (2019). Model for practice badminton basic skills by using motion posture detection from video posture embedding and one-shot learning technique. *Proceedings of the 2019 2nd Artificial Intelligence and Cloud Computing Conference*, 117–124.

Saleh, H. A., Hasyim, H., & Fauzan, M. M. (2024). Influence Learning Strategies to Enhance Physical Condition and Focus in Young Badminton Players During Matches. *EDUKASIA: Jurnal Pendidikan dan Pembelajaran*, 5(2), 311–322.

Suh, D., & Jeong, J. (2025). Effects of Quantitative and Qualitative Visual Feedback on Motor Learning in Male Novices During a Badminton Underhand-Clear Striking Task. *Journal of Motor Behavior*, 57(6), 723–736.

Tzetzis, G., & Votsis, E. (2006). The effect of different feedback methods on badminton skills acquisition and retention. *Perceptual and Motor Skills*, 102(1), 275–284.

Zhou, X., Imai, K., & Ren, Y. (2019). Teaching method using task analysis to boost motor skill and badminton forehand overhead clear skill learning. *International Journal of Sports Science & Medicine*, 3, 47–53.