Pubmedia Jurnal Pendidikan Olahraga Vol: 3, No 1, 2025, Page: 1-13

The Impact of Skill Exercises According to Self -efficacy Method on some Visual Perception Skills and the Learning of Shooting Skill in Basketball for Students

Salam Musa Shakir*

University of Diyala

*Correspondence: Salam Musa Shakir
Email: salam.sami@uodiyala.edu.iq

Received: 05-07-2025
Accepted: 16-08-2025
Published: 28-09-2025

Abstract: *This study aims to analyze the impact of skill-based exercises grounded in the self-efficacy approach on the development of visual perception among learners during the acquisition of the basketball shooting skill. Self-efficacy is a core psychological concept that reflects an individual's confidence in their ability to perform tasks and achieve goals, and it plays a fundamental role in enhancing both motor and visual performance. The problem of the study lies in the weakness of visual information processing among some learners, which leads to deficiencies in shape discrimination, distance perception, object recognition, figure-ground differentiation, as well as challenges in visual memory and spatial awareness. The researcher adopted an experimental methodology, dividing the sample into two groups: a control group and an experimental group. Standardized tests were administered to assess visual perception and shooting performance, and the data were analyzed using the SPSS statistical software. The results revealed statistically significant differences in favor of the experimental group, indicating that exercises based on the self-efficacy approach effectively enhanced learners' perceptual, imaginative, and motor response abilities. These exercises also contributed to improving visual understanding through structured repetition, practical application, and interactive explanation. In light of these findings, the study recommends applying this training approach in other sports disciplines, given its positive impact on the development of visual and motor performance among learners.*

Keywords: *Self-Efficacy, Visual Vision, Skill of Shooting in Basketball*

Introduction

Self-efficacy is a complex process of self-evaluation and self-persuasion that underlies the judgments individuals make about their belief in their ability to achieve. This process is known as self-efficacy and relies on cognitive processing from diverse sources of efficacy information. Moreover, It is a psychological mechanism that governs the individual's belief in his ability to control situations that influence his life (Bandura, 1989). It doesn't depend on the extent of the individual's belief in his ability to organize and implement the courses of the work that enable him to achieve successful performance of the skill he possesses. But it depends on what the individual thinks he is able to achieve using these skills. Self-efficacy can be viewed as self-confidence linked to a particular situation, which influences the types of activities that individuals choose to practice, the effort exerted and the degree of perseverance shown in situations of failure. Personal effectiveness

expectations are depend on four main resources of information: successful experiences, alternative experiences, verbal persuasion, and emotional and physiological arousal.

Performance achievements are considered the most influential resource of self-efficacy information (Bandora, 1997) Through consistence successful performance expectations of competence are built. High self-efficacy resulting from past performance achievements determines sustained effort and perseverance, they are considered a key to overcome occasional failures, ultimately improving performance. Indirect experiences involve direct observation of one's own or others' performance, which reinforces expectations of effectiveness. Especially when observing the successful performance. Self-efficacy can determine performance in sports and exercise through observation of others, as individuals continue their efforts until the performance outcome matches the standards set by the individual based on indirect experiences.

individuals' self-efficacy is enhanced and performance is improved through modelling (Feltz, Landers, & Rider, 1979; McCauley, 1985). Verbal persuasion is widely used because it is easy to use, convincing individuals of their ability to successfully deal with what may have been a burden in the past. Individuals who are socially persuaded by coaches, parents, and peers to believe in their ability in achievement are more likely to demonstrate greater effort and perseverance, which improve their performance. Self-efficacy beliefs predict an individual's behaviors, thinking patterns, and motivations. Individuals with high self-efficacy participate more actively and more frequently, exert greater effort, and continue training for longer periods, and that improves performance in both sports and exercise. The higher the self-efficacy, the greater the persistence and effort, as measured by motor performance. High confidence in an individual's ability to use his skills and deliver successful performance can motivate effort and perseverance, thus improving performance. High self-efficacy of individuals' enhances their commitment to exercises compared with those of low self-efficacy. Those of high self-efficacy have more tendency to exert effort and perseverance overcoming the obstacles like tiresome and time limitation. which contribute to maintaining exercise and improving performance during exercise.

The significance of the study lies the fact that students are exposed to changing situations of opponents, audiences and stadiums, which requires them to possess self-efficacy that helps in developing motivation to achieve educational objectives and learn the basic skill of basketball and visual perception so that they can understand, perceive and imagine performing such basic skills and thus the learning process either achieved or increased. The method of self- efficacy of the student is related to the rational processes such as understanding, recognition and imagining the performance of the skill through training, practicing, motivation and readiness to the learning processes

Problem of the Study

Self-efficacy is considered as the individual's belief in his ability to perform certain actions to achieve a specific result. This theory, proposed by Albert Bandura, has an important role on athletes and athletic performance. As educators, we can find a way to develop self-efficacy in our students. We will be able to help them release their full athletic

potential, how to build training plans and teach them in a way that enhances their self-efficacy.

In addition to vision for their athletic performance, although they do general training and vision training, but in a random manner, athletic performance includes a motor aspect and a visual aspect, and if the visual aspect is not included and works efficiently, this will naturally affect the performance of the motor aspect.

Incorporating visual-perception exercises into the educational session, independently or implicitly, is one of the most important and vital factors that help in developing visual-motor abilities. This is what the researcher intends to achieve by developing a suitable visual educational session for basketball and observing its effect.

Aims of the Study

1. Setting skill exercises with the method of self-efficacy of visual perception for students.
2. Knowing the impact of skill exercises according to the method of self-efficacy of visual perception on learning shooting skill in basketball.

Assumptions of the Study

1. There are differences with statistical reference in the tests of shooting with the method of self-efficacy of visual perception between the pretest and the posttest for the experimental and control groups for the priority of the posttest.
2. There are differences with statistical reference between the experimental and control group in the posttests, in learning shooting skill in basketball, and for the priority of the experimental group.

Domains of the Study

1. Human Domain: First stage students of College of Physical Education – University of Diyala.
2. Spatial Domain: Halls and courts of College of Physical Education – University of Diyala.
3. Time Domain: The period from 1\3\2025 to 10\4\2025

Identifying Terminology

1- Visual Perception: The ability to process or interpret the information seen, which affects athletic performance and helps enhance motor skills, and visual perception depends on the eye providing information to the brain (Suad Abdul Hussein, 2015).

2- Self-efficacy: It is a person's ability to perform skillfully, defeat performance pressures, and continue the necessary hard work to master his skills (Ahmed Arabi, 2009). It is also represented in the successive steps or factors that constitute the social learning process, beginning with paying attention to a specific object and observing, then memorizing that object or model in your mind. Then comes the production stage or ability to perform, and finally, the motivation to perform.

Methodology

The researcher used the experimental method with the design of two equivalent groups with a pretest and a posttest, due to the nature of the suitability of the problem of the study. (Obeidat: 2000).

Community and Sample of the Study:

The community of the study consists of (250) students in the first-year College of Physical Education and Sports Sciences at the University of Diyala for the academic year 2025, distributed among four groups. The researcher chose one group, of (50) students, deliberately.

Whereas the sample of the study "The sample is the part that represents the original community or model on which the researcher conducts the overall and central focus of his work (Marwan Abdel Hamid, 2002).

The sample was chosen randomly, consisting of 12 students, and the pilot sample consisted of 10 students from the original research community and from outside the research sample. The research sample constitutes (24%).

Table (1) Pilot "experimental' Design of the Sample of the Study

Groups	Pretest	Independent Variable	Posttest	Difference between the tests	Difference between groups (Experimental and control)
Experimental Group	Tests of visual perception and Shooting	Skill exercises according to self-efficacy approach	Tests of visual perception and Shooting tests in basketball	Difference between the pretests and the postetst	Difference between the two tests for the two groups
Control Group	Tests of visual perception and Shooting	Traditionally followed method	Tests of visual perception and Shooting tests in basketball		

Homogeneity and Equivalence of the Sample

In order to reach a single level for the research sample and to avoid variables that affect the study results in terms of individual differences, the researcher performed homogeneity for the variables (age, weight, and height).

Table (2) Homogeneity of the Sample

Variable	Mean	Standard Deviation	Median	Skewness
Age	19.6	1.9	19	0.94
Height	1.76	0.5	1.70	0.36
Weight	65.64	5.87	86	0.94
Shooting skill	12.16	2.76	13	0.34

Table (2) shows that the values of the skewness coefficient are less than (+_3), indicating that the sample is homogeneous. In order to determine the limits of equivalence between the individuals in the control and experimental study groups, the researcher conducted a T-test between the two groups, as shown in Table (3).

Table (3) Equivalence of the two groups for the research groups T-value between the control and experimental groups in (age, height, and weight(

Variable	Control Group		Experimental Group		Calculated T	Critical T
	Mean	Standard Deviation	Mean	Standard Deviation		
Age	19.8	1.8	19.6	1.6	1.42	2.13
Height	1.75	0.20	1.73	0.23	0.37	
Weight	67.4	5.63	68.2	7.22	1.87	
Shooting skill	13.32	2.78	14.15	2.56	1.95	

Degree of freedom (DF) (sample-1) = (12-1)=11 (α) 0.05

Table (3) Shows the values of calculated T less than the critical T when (α) (0.05). This indicates that there are no differences between the two groups , experimental and control.

Data Collection Methods

To achieve the research objectives and implement field procedures, the researcher depended on the following data collection methods, research devices, and tools:

1. Arab and foreign sources
2. Testing and measurement

Equipment and Tools of the Study:

1. Arabic and foreign sources
2. Personal interviews
3. Cognitive motivation scale
4. Tests
5. Observation
6. Registration forms
7. Legal field
8. Basketballs
9. Whistles, tape measures, registration forms, electronic and manual calculators, medical scales, stopwatch, paper, and pens.

Tools of the Study

Tests of visual perception (Mithaq Ghazi, Najat Badr, p. 27)

a. **Visual concentration test:**

Purpose of the test: To measure the level of visual concentration.

Equipment used: (8) basketballs with different colored markings, paintbrush, and affixing the English alphabet letters to the sides of each ball, provided that these letters are capitalized.

Age and gender level: Students in the College of Physical Education, first year, in basketball.

Method of performance: The examinee stands at the free throw line and the colleague passes ten balls of different colors in succession. On each ball are written letters in the English alphabet on both sides that indicate fouls in basketball (p-t). When receiving the ball and before shooting, the player must identify the letters

written on the ball and then perform the shooting process (the test consists of receiving eight balls and shooting).

Scoring:

[1] If the examinee identifies the letter on the ball and assesses the shooting, and the ball enters the basket, he is given two points.

[2] If the examinee identifies the letter on the ball but the ball does not enter the basket, he is given one point.

[3] If the examinee does not recognize the letter on the ball and whether or not the ball enters the basket, he is given zero points.

b. Visual-Motor Response Speed Test:

Purpose of the test: To measure visual-motor response time.

Equipment used: A goal board, (18) basketballs of various colors (red, orange, yellow), a stopwatch, and a timer. Age and gender: First-year basketball students.

Age and gender level: First-year basketball students.

Method of Performance: (18) balls of different colors are placed inside the restricted area, 4 meters from the end line, scattered and fixed in a triangular shape resembling billiard balls. When starting, the examinee stands under the hoop and when the start signal is given. The examinee runs and tests the balls that match the color of the hoop and shoots from under the basket and in the manner he sees fit from the right or left, provided that the shooting is on the scoreboard. The test ends when he has finished scoring with the six red balls.

Time is calculated from the start to the end of the test. If the balls do not enter the basket, one second is added to the total test time for each failed attempt.

Basic skills test

1- Forward Shoot Test: (Fayez Bashir Hamoudat, Mu'ayyad Abdullah Jassim, 1987, pp. 201-202)

Purpose of the test: To measure the player's specific skill in forward shooting at the target.

Equipment used: a basketball court and goal.

Method of Performance: The examinee shoots on the target from outside free throw zone and from The area that extends along the free throw line and at its intersection with the circle. A sign must be installed in the area specified for shooting.

Conditions of Performance:

1. The examinee may shoot with one hand or both hands, using any shooting method.
2. The shot must be score directly at the target without touching the target board.
3. The examinee has (15) attempts, which are performed in three sets of five shots each.
4. Shooting must be performed in the designated location.
5. The examinee is permitted to perform some experimental shots before the start of the test.

Scoring:

1. If the hoop is touched and the ball does not enter the basket one point will be awarded for such a shot.

2. Two points are awarded for each successful shot in which the ball enters the basket.
3. Points are not awarded when the ball touches the board.

Note: This test is for both genders.

2- Side Shoot Test:(Fayez Bashir Hamoudat, Mu'ayyad Abdullah Jassim, pp. 205-206)

Purpose of the test: The test aims to measure the skill of shooting from the side, from a place specified on one side of the target outside the free throw area.

Equipment used: a basketball and a goal of a basketball game

Method of Performance: A place is designated on both sides of the court, (6m) away from the goal center. The examinee has the right to shoot using one hand or both hands, provided that he performs ten shots from one side of the basket, after that he moves to the other side to perform ten more shots.

Conditions of Performance:

1. The distance should be (6 m) for boys and (4.5 m) for girls.
2. As a trial, the examinee has the right to perform some shots before starting the test.
3. Shooting must be done from the designated location.
4. The examinee performs shots from each side, bringing the total number of shots to (20) shots on both sides.

Scoring:

1. Two points are awarded for each successful shot in which the ball enters the basket.
2. One point is awarded for each shot in which the ball touches the target but does not enter the basket.
3. Points are not awarded for shots in which the ball touches the goal board.
4. Thus, the total number of points can be recorded for the twenty shots made by the examinee (ten from each side), meaning that the maximum number of points is (40) points.

Pilot Experiment:

The researcher conducted the pilot experiment on Tuesday 3/11/2025 for basketball shooting tests. It was conducted on a sample of (10) students other than the study sample from the first-stage students. Seven days later, the experiment was repeated on the same sample to control the study variables.

Scientific Bases of the Tests:

In order to obtain the foundations for the tests, which are determined by reliability, validity and objectivity, the following was conducted, as shown in the table below.

1- Reliability and Validity of the Test

The reliability of the test under investigation was calculated by retesting, then the correlation coefficient between the test results was used. The period between the application results was (7) days. The basketball shooting test and visual perception tests were firstly conducted on 3/19/2025 and repeated on 3/25/2025 on the same sample consisting of (10) students, as shown in table (4).

Table (4). Reliability and self-validity coefficients for skill and visual perception tests

No	Tests	Reliability Coefficient	Validity Coefficient	Significance
1	Visual perception tests (visual concentration, Visual-Motor Response Speed)	0.80	0.88	Significant
2	Forward Shoot	0.81	0.89	Significant
3	Side Shoot	0.85	0.87	Significant

Objectivity:

The researcher verified the objectivity of the skill tests used and their suitability to the sample level by presenting them to experts specializing in the field of motor learning, measurement, testing, and teaching methods, They were fully approved.

Pretests:

The researcher applied the skill tests and visual vision tests to the research sample for the two groups on Wednesday 3/26/2025. The researcher explained to the students what they should do and how to perform. The researcher conducted the skill tests and visual perception tests on the sample for the two groups on Wednesday 3/26/2025. Then the skill test used in the study, which is the skill of shooting a basketball, was conducted on the study sample, (12) students, for the experimental and control groups. Preparing the required supplies and tools with the help of the support team and under the supervision of the researcher.

Table (5). Arithmetic mean, standard deviation, and calculated and critical t-value for the shooting pretests for the students in the two study groups.

Group	Number	Arithmetic mean	standard deviation	Calculated T	Critical T
Control	12	12.1	0.66	0.977	0.49
Experimental	12	11.2	0.74	0.952	

It is clear from table (5) that there is no statistically significant difference between the students of the two study groups in the shooting and the visual perception tests, because the calculated value of (t) for the control group is (0.977) and the experimental group is (0.952), which is less than the value of critical (t) which is (0.49), so the two groups are equivalent in this variable.

Conducting the Skill Tests

The researcher designed a set of basketball skill exercises grounded in the self-efficacy approach, incorporating elements of students' visual perception abilities—specifically targeting the shooting skill. The intervention consisted of twelve structured instructional sessions administered to the experimental group.

These sessions commenced on Wednesday, February 4, 2025, and were delivered twice weekly until the completion of the designated training period. In parallel, the control

group received instruction through conventional pedagogical methods employed by a specialized basketball instructor. Both groups were trained under identical conditions in terms of time, location, and number of sessions, ensuring consistency across the experimental framework.

Statistical Means of the Study

To treat the data, the researchers used (SPSS).

Result and Discussion

4.1 Presentation and analysis of posttest results using the self-efficacy approach for selected visual perception skills and the acquisition of the basketball shooting skill in the control and experimental study groups

Table (6). Shows the mean, standard deviation of differences, standard error, calculated T-value, error ratio, and their statistical significance for the pre- and post-tests of shooting skills for the control group.

Tests	Measurement Unit	M	SD	Standard Error	Calculated T	Error ratio	Significance
Visual perception tests	mark	1.417	1.564	0.452	3.137	0.009	Significant
Forward Shooting	mark	1.833	0.937	0.271	6.775	0.000	Significant
Side Shooting	mark	0.244	0.367	0.106	2.305	0.042	Significant

It is evident from the table above that the statistically significant differences are attributed to several variables that interacted during the learning process, ultimately leading to the emergence of meaningful differences between the pre-test and post-test results. The degree of improvement observed in the control group's post-test outcomes serves as the benchmark for assessing performance advancement. This is supported by the study conducted by Khalid Fareed (2008), which emphasized that comparing the post-test results between the two research groups is the primary criterion for determining the level of progress achieved by each group.

Although the control group demonstrated some improvement, it did not reach the level of advancement observed in the experimental group. The researcher attributes these differences to the exercises specifically designed for the experimental group. Many still perceive play merely as a form of entertainment; while it is undoubtedly enjoyable, it also serves an educational purpose. Baden-Powell asserts that "play is the foremost and greatest educator." Furthermore, Adnan Abd Kidr (2017) highlights that skills encompass numerous values and possess the potential to foster cooperation, refine sensory precision, and promote collaborative work.

Table (7). Shows the mean, standard deviation of differences, standard error, calculated (T) value, error ratio, and their statistical significance for the pre- and post-tests of shooting skills for the experimental group

Tests	Measurement Unit	M	SD	Standard Error	Calculated T	Error ratio	Significance
Visual perception tests	mark	3.333	1.371	0.396	8.423	0.000	Significant
Forward Shooting	mark	2.417	0.996	0.288	8.402	0.000	Significant
Side Shooting	mark	0.753	0.695	0.201	3.754	0.003	Significant

The table above clearly indicates that the statistically significant differences are attributable to the impact of the self-efficacy approach based on visual perception in learning basketball shooting skills. These differences stem from the exercises practiced during training sessions, which stimulated students and enhanced their motivation to learn shooting techniques. The researcher also attributes this effect to the detailed verbal descriptions and explanations of the skills, which undoubtedly contributed to constructing an accurate mental representation of the basketball skills under investigation. Moreover, the repetition accompanying performance within each training session, along with the precision of implementation, played a crucial role in skill acquisition and the effective use of practice time. Repetition and practice are recognized as powerful and positive educational tools for facilitating learning and developing motor skills. As Nabil Mahmoud Shaker (2010) notes, "Practice is a fundamental condition for learning; learning does not occur without practice, which enables initial skill acquisition, improves coordination, and stabilizes performance." In addition, students' desire and motivation are essential contributing factors.

Wajih Mahjoub (2002) emphasizes that accurate object identification requires individuals to possess coordinated and meaningful visual-motor experience. Any disruption in the integration of sensory systems responsible for essential actions may result in errors in learning and performing motor skills. These stimuli must be received and interpreted correctly. This is further supported by the study conducted by Nabil Abdel Hadi et al. (2011), which found that auditory, visual, and motor memory involve the individual's ability to recall or imagine objects in the absence of the original sensory stimulus—commonly referred to as imagination. Such memory may be immediate, future-oriented, or rooted in past experiences. The researcher attributes these findings to the initial stage of visual perception, which plays a critical role in the rapid understanding of the nature of the stimulus. This understanding enables the selection of an appropriate motor program, which is achieved through the development of visual perception skills via intensive training.

Such training reduces the time between stimulus and response, thereby enhancing motor task execution. This aligns with the findings of Mustafa Abdel Rahman (2004), who noted that the angle formed by the stimulus image on the retina—especially when the image is confined within a large angle during focal attention—allows for clearer visualization of the stimulus details. In contrast, during distributed attention, the larger the angle of the

stimulus location, the smaller the retinal image angle due to overlapping lateral boundaries. This leads to a perceptual difference compared to focal attention conditions.

Conclusion

1. The exercises implemented using the self-efficacy approach through visual perception, designed according to scientific principles, were appropriate for the sample of the study.
2. Visual perception exercises have a direct and effective impact on students' basketball shooting skills.
3. Measuring the level of visual perception and understanding its role is crucial in the learning process and in enhancing technical performance in basketball shooting.
4. Managing students' anxiety and stress levels enhances efficacy and imaginative experiences, thereby leading to successful performance.
5. Employing the self-efficacy approach fosters students' ability to handle specific tasks and situations, as well as general self-expectations.
6. Visual perception exercises improve students' imagination, spatial awareness, shape recognition, and visual discrimination, leading to positive outcomes.

Recommendations

Based on the findings, the researcher recommends the following:

1. Use performance achievements to help students feel they have mastered a skill, thereby influencing their perception of their abilities. Indirect experiences (modeling) in sports education—demonstrating how to perform a task precisely—can be highly effective.
2. Observing someone performing a task can lead students to believe they are capable of doing it themselves, especially when the performer shares a similar skill level. Verbal persuasion also motivates learners and enhances skill acquisition.
3. Encouraging and motivating students through positive dialogue and emotional stimulation. Changing the athlete's emotional state through supportive communication and attention to physiological conditions positively influences the learning of basketball shooting skills.
4. Emphasize modern visual perception exercises that engage students and stimulate the learning process in basketball.
5. Conducting further studies using the self-efficacy approach across different variables and motor skills.

References

Abdul Hadi, N., et al. (2000). Slow learning and its difficulties (5th ed.). Amman: Dar Wael Publishing.

Abdul Rahman, M. (2004). Design and standardization of testing devices to measure expectation and attention (focal and distributed) in basketball and handball (Unpublished master's and doctoral thesis). University of Basra.

Akbaş, E., & Ertan, H. (2019). Biomechanical analysis of forehand topspin stroke in elite table tennis players. International Journal of Sports Science & Coaching, 14(3), 367–375.

Araibi, A. A., & Mahmoud, G. S. (2009). Contemporary trends in sports psychology. Baghdad: Dar Al-Kutub wa Al-Watha'iq.

Basheer, F., & Jasim, M. A. (1987). Basketball. Mosul: University of Mosul, Dar Al-Kutub for Printing and Publishing.

Chen, J., & Yang, F. (2024). Motion capture analysis of forehand stroke biomechanics in elite table tennis athletes. Frontiers in Sports and Active Living, 6, 1441523.

Ezzat, K. F. (2014). The effect of instructional units using practice scheduling forms on physical and skill variables in judo beginners. College of Physical Education, Benha University, Saudi Arabia.

Ghazi, M., & Badr, N. (2013). The relationship between visual perception skills and basic basketball skills among youth players of Al-Karkh Club (ages 15–16). Al-Muthanna University Journal, Physical Education and Sports Sciences, 2(1).

Guo, Y., & Liu, S. (2022). Predicting stroke accuracy in table tennis using kinematic and dynamic variables. Sensors, 22(19), 7391.

Iino, Y., & Kojima, T. (2021). Influence of racket motion and ball velocity on stroke accuracy in elite table tennis players. European Journal of Sport Science, 21(5), 642–650.

Ismail, M. A. M. (2002). Methods and approaches of scientific research in physical education and sports (5th. ed., p. 531). Amman: Scientific House for Publishing and Distribution.

Job. (2002). Physiology of learning (5th. ed.). Amman: Dar Al-Fikr for Printing, Publishing, and Distribution.

Kanbar, H. A. (2014). Visual functions and skills in sports (1st. ed.). Beirut: Dar Al-Kutub Al-Ilmiyya.

Kim, H., & Park, S. (2023). Kinematic analysis of forehand stroke execution and its impact on accuracy. Sports, 11(6), 123.

Kondrič, M., Zhang, T., & Furjan-Mandić, G. (2020). Advances in table tennis biomechanics and their application to performance enhancement. Sports Biomechanics, 19(4), 521–536.

Kuan, Y., & Lee, C. (2019). Effects of racket angle on ball trajectory and spin in table tennis. Journal of Human Kinetics, 68(1), 45–54.

Li, H., & Xu, Y. (2022). The effects of ball speed and racket angle on performance variability in table tennis. Journal of Human Movement Science, 82, 102922.

Liang, J., & Chen, Y. (2023). Effects of training interventions on racket angle control and shot precision in young table tennis players. International Journal of Sports Physiology and Performance, 18(3), 401–408.

Ma, W., & Wang, P. (2022). A comparative biomechanical study of offensive and defensive strokes in table tennis. Sports Biomechanics, 21(7), 965–978.

Mahjoub, W. (2002). Physiology of learning (5th. ed.). Amman: Dar Al-Fikr for Printing and Distribution.

Obeidat, D., et al. (2004). Scientific research: Concepts, tools, and methods (Vol. 2, 8th ed.). Amman: Dar Al-Fikr Publishing.

Qian, J., & Zhang, X. (2021). Time-motion characteristics and biomechanics of forehand strokes in competitive table tennis. Journal of Sports Engineering and Technology, 235(4), 358–367.

Shaker, N. M. (2010). The world of motor, psychological, and cognitive movement. Diyala: College of Physical Education, University of Diyala.

Sun, Z., & Zhao, Y. (2023). The relationship between racket inclination and spin generation in topspin shots. Journal of Sports Sciences, 41(12), 1591–1600.

Wahib, S. A. H., & Abdul Hamid, G. N. (2015). Scientific concepts of visual perception (1st. ed., p. 50). Baghdad: Al-Jazeera Printing and Publishing.

Wang, L., & Zhou, S. (2020). Kinematic determinants of accuracy in table tennis forehand topspin. Journal of Sports Sciences, 38(14), 1645–1654.

Wu, Y., & Zhang, L. (2024). Biomechanical modeling of racket-ball interaction and its influence on shot precision. Applied Sciences, 14(2), 546.

Zhang, J., & Wang, L. (2021). Relationship between racket angle and accuracy in topspin forehand strokes. International Journal of Table Tennis Science, 15(2), 78–89.