

# The effect of training using an electromechanical-optical device designed to improve the speed and accuracy of scoring for advanced Futsal footballers

<sup>1</sup>Asst. Prof. Dr. Mohammed Ali Majeed Zayer

## Abstract

The importance of the research was demonstrated by applying exercises through the use of an electro-mechanical-optical device designed to develop the speed and accuracy of scoring for futsal players. The problem lies in the question: Does training using the optical electro-mechanical device designed to develop the speed and accuracy of scoring among futsal players for advanced players?

The aim of the research was to design an electromechanical optical device to develop the speed and accuracy of scoring, and to prepare exercises through the device and to identify their effect. The researcher used the experimental approach in the method of equal groups. The researcher conducted two exploratory experiments (for exercises and for testing), as well as applying the scientific foundations to the test, and the researcher applied the exercises on the device for a period of (10) weeks at a rate of (3) units per week with a total of (30) training units, and after data collection and treatment appeared statistically An improvement in the speed and accuracy of scoring, the researcher concluded that the exercises with the help of the designed electromechanical device contributed to the development of the time and accuracy of scoring for the research sample. The designed device had a positive impact on players' development.

**Keywords:** electromechanical device, speed and accuracy of scoring, futsal

## Introduction :-

Sport is one of the most important areas in the life of peoples, so the interest in it continues to achieve the highest levels of sporting achievements, and training and preparing athletes is important and necessary in order to raise their level high, and that the development that occurred in the achievements of players was due to the development of training science and its overlap with science The other and what is related to modern mastery, where the desired goals of training are achieved through the continuity of training according to the scientific foundations, where it has a clear effect on developing the level of technical performance of the players and the type of activity practiced, as well as the use of auxiliary means and devices to raise the level of players, as training is a phrase For all the loads that are given to the athlete in a certain period of time, aiming at raising athletic achievement, so that the functions of the internal and external organs are changed. (Hussein, 1998, p.16).

The interest and passion that football receives has imposed on researchers and those in charge of it to search in pursuit of methods and strategies that help raise the level of skillful performance of the players in order to bring them to the highest levels, and because the game of football depends on many of the skills of control and control of the ball that my game must The team excels in being a game of skills, which coaches seek to develop the skillful side of the players during the training units, and in order to achieve achievement and reach the highest levels, we must invent new methods through modern technical means, through the use of devices in the training unit for the purpose of developing the capacity and potential of the players. "Studying basic skills and knowing the different methods of teaching and training them are among the important subjects required by the game of soccer." (Camash, 1999, p.9).

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<sup>1</sup> University of Baghdad / College of Arts  
Email: mohammedaabb@yahoo.com

The use of training devices during the training units that aim to develop the players' ability to accuracy of scoring are useful devices because of this skill of a great role in raising the percentage of the team in achieving victory in the match, as well as developing the ability of accuracy because the players must be proficient in scoring and with high accuracy, so it does not help One improvement percentage from the other, "The mastery of scoring and the ability of the team's players from the accuracy of the goal hitting gives the possibility to raise the morale of the team players and to increase their capabilities and sufficiency, raise the level of ambition of the players and improve their level and make the highest effort to achieve victory" (Khalif, 1999, p.7)

As the work of coaches at the present time is no longer based on preparing training curricula only, but rather on the use of assistive training devices and means that work to raise the level of players' performance, as sports equipment has become a nerve in the field of sports training, because of the great support it provides to coaches in conducting and implementing operations The different training devices, and that these devices reduce the waste of time for the coach and the players and facilitate the process of communicating information. It addresses the largest number of senses and develops the creativity capacity of the players and therefore adds fun and excitement and increases the variety of training stimuli as the player can rely on himself through real-time feedback and in this way the player can To improve his performance. "Training devices are an important factor in developing ability, especially those that work in the motor and skill areas." (Saeed, 2018, p.25)

As each sporting event has its own equipment that the coach depends on during the training unit and for the purpose of developing its own capabilities related to the performance of the players, and from here we notice the extent of development that sports games have reached and the game of football is one of these games. "The results showed that the use of technology affects the teaching of mathematical skills and the improvement of the training process. It also works and helps the trainer to achieve the training goals efficiently and easily." (Saeed, 2018, p.25)

Many studies have been conducted in the futsal game on the skill of scoring, but with this study the researcher is working on designing an electromechanical device that improves the scoring accuracy of the players and the places affecting the goal as well as the response time of movement.

Hence, the importance of research was demonstrated by applying special exercises through the use of an optical device designed to assist in developing the speed and accuracy of scoring for advanced futsal players.

Research problem: The futsal game has witnessed a great development in recent years and at the level of all aspects, including the aspect (skill) and scoring is one of the basic and necessary skills in this game, and players must do it well because of its role in determining the outcome, and because it is a game that plays in small areas and not There is ample time when scoring, so the player needs speed when scoring and with high accuracy, and for its importance, the coaches focus during the training units on developing the capabilities of all players in general on them and therefore the methods and methods for developing them varied, and they still need the best and latest means to develop them.

There are some aspects that did not receive the required attention, including training players using innovative and modern devices for scoring skill, which would develop speed and accuracy together associated with the scoring skill, which we need together with skill. From the researcher's point of view, the problem lies in the following question: -

Does training using the assistant designer, using an electromechanical-optical device, develop the speed and accuracy of scoring for futsal players for applicants?

The research aims to design an electromechanical and optical assistive device to develop the speed and accuracy of scoring for advanced futsal players, and to prepare special exercises through the device in developing the variables under study in the research sample, as well as to identify the effect of these exercises through the designed device.

The researcher assumed that the exercises for using the designed device had a positive effect on developing the speed and accuracy of scoring among advanced Futsal soccer players, the existence of statistically significant differences between the pre and post tests for the two research groups (control and experimental) and in favor of the post, as well as the existence of statistically significant differences in the test results The dimension of the two groups (control and experimental) and in favor of the experimental group.

Ismail Qasim Jamil's study aimed at identifying the effect of exercises for the use of devices and watt in developing the speed of movement response and accuracy of handling and scoring for futsal players, and used the experimental approach to design equal groups with pre and post testing for a sample consisting of (20) players, where it was recommended to introduce devices Training and developing speed and accuracy of skills

**Method and tools: -**

The researcher used the experimental method in the style of equivalent groups (control and experimental) to suit the version of the problem.

The research community was determined by the players of Baghdad governorate clubs for the futsal premier league, whose number reached (8) clubs for the season (2019/2020), and the police club players were deliberately chosen to represent the research sample of (20) players, as the sample percentage reached (12, 5%) of the original community.

The researcher conducted parity for the two research groups (control and experimental)

Table (1) shows the parity of the two groups in search variables

Variables	Unit of measurement	Experimental		The officer.		Value T Calculated	True SIGNIFICANT	Level of significance
		Q	P	Q	P			
Scoring accuracy	Degree	2.0000	1.05409	1.9000	.87560	.231	.820	Insignificant
Scoring speed	Time	3.0520	.34214	3.1750	.32857	-.820	.423	Insignificant
Motor response speed	Time	2.4800	.26721	2.5800	.33437	-.739	.470	Insignificant

Insignificance < (0.05) at degree of freedom (18) and below the level of significance (0.05).

The researcher used a number of methods of collecting information, such as Arab and foreign sources, observation, tests and measurements, in addition to his use of devices and tools such as an electronic computer, a video camera, a stopwatch, a soccer ball, a stadium, a whistle and a stopwatch, as well as an electromechanical and optical device designed.

After the idea was crystallized, the researcher directed to design his auxiliary training device consisting of a pillar in the middle at a height of (2 m) from the ground, and installed on an iron base measuring (50 cm<sup>2</sup>) fixed on wheels to be tightened on the tube. Up two and down two, the size of these squares (50 cm). The movement of the device is on the rail that (a square tube measuring 2 inches) is (3 meters) long, and the rail is locked at the end to be the fulcrum to prevent the device from escaping. Wear that allows the cord to be wound over.) And placed bumpers at the end of the device in order to absorb the shock from the movement of the device. A voltage transformer (220 volts to 40 volts / 100 amperes) was placed first to supply the main electricity with a two-way contactor with a diode tower. These are all located in the control panel and connected to the motor (DC motor) and the movement is carried out via a remote control. Four keys, one on and the other for off, and the other two switches move the device to the right and left.

The device works to develop the speed and accuracy of scoring for the players, and it increases the thrill and competition between the players, as well as gives the player to rely on himself by obtaining immediate feedback.



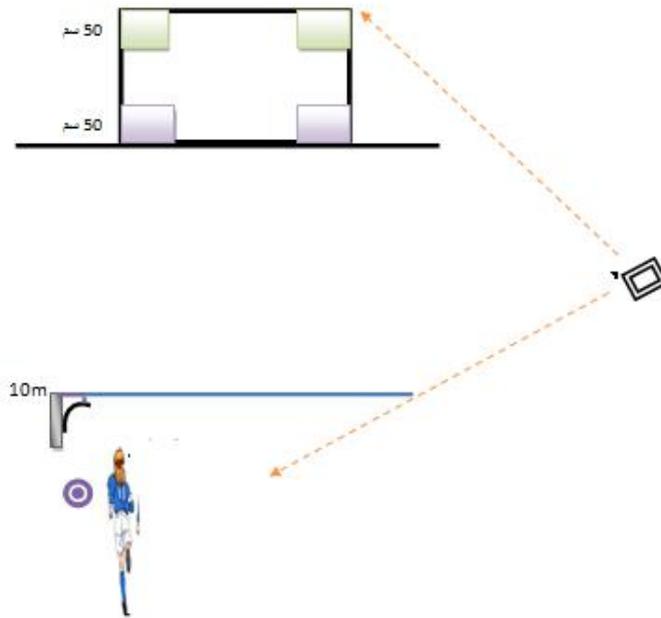
The first test: - Scoring speed and accuracy (average). (Jamil, 2012, p.102)

The objective of the test: to measure the speed and accuracy of scoring.

Devices and tools used: The futsal soccer goal is legal (3 x 2) m, squares of (4) dimensions (50 cm<sup>2</sup>) are placed in the upper and lower goal corners, a side handling device, a leather tape measure, a soccer ball count (10) Whistle, color sticker, digital camera for scoring speed measurement, Sony 16.1MP video camera.

**Description or method of performance:** The player stands on a line 13 meters away from the target and when he hears the alarm from the coach, he kicks the ball to the side handling device located at a distance of 10 meters from the goal and the player moves towards the rebound ball from the device to aim it towards the goal, trying to hit the squares at the corners of the goal. All players perform the first attempt, consecutively.

**Method of scoring points:** Registration is done in the information collection form on the basis of hitting the squares on the goal, and through the digital camera film that is shown on the kinovea program, the speed is calculated. A score when the ball hits the square frame, except for this, zero is awarded, and each player is awarded (3) attempts.



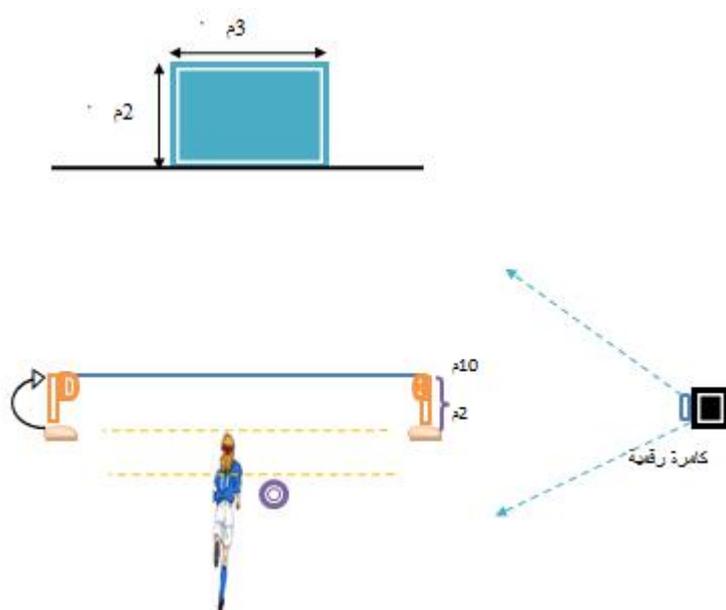
The second test: motor response velocity (modified) (Jamil, 2012,109)

The objective of the test: to measure the speed of the kinematic response with the ball

**The tools used:** the sound alarm device, the whistle, the five-goal football (2x3) m, the futsal football number 10, a leather tape measure, a colored tape, a Sony video camera number two, a digital camera.

**Method of performance:** the player stands behind a line 14 meters away and upon hearing the instruction from the (recorder) the player rolls the ball and when reaching the sound alarm device which is 2 meters away from the 10 meters line the device sounds an alarm or sound and the player must perform the kick on the target as quickly as possible. All players first try successively.

**Time Recording:** The time is recorded through a digital camera, as this is done through the imaging display in the program (kinovea), where the time is read one thousandth of a second for the three attempts of each player, noting that the recording time starts from the moment of instruction by the sound alarm device with a light alarm that works At the same time, the reason is that the digital camera does not record sounds, but only light, and the player can hear the sound



**Exploratory experience:** - The researcher conducted the exploratory experiment of testing the study on a group of players from outside the research sample represented by the (Baghdad Municipality) club to find out the validity and suitability of the test as well as to identify the actual time of the test, and at the Baghdad Municipality club hall on Sunday 6/1 / 2019.

Then a second reconnaissance experiment was conducted for the exercises through the device designed on a sample of players who are outside the research sample from the Baghdad Municipality, to find out the obstacles facing work and avoid them and ensure the validity of the device on Tuesday 15/1/2019.

**The scientific foundations of the test: -**

**Validity of the test:** Validity is a basic condition of the test tools, which is that "the task of the test is to measure and evaluate the characteristic for which the test was actually set." (Jawad, 2004, p. 22)

The researcher applied the validity of the content to the test, and the researcher extracted the self-validity of the test by calculating the square root of the test reliability factor.

**Stability of the test:** What is meant by the static test "is that which gives almost the same results if applied by the same people in two time periods, and under one circumstances." (Spring, 2006, p. 156)

The researcher used the test and re-test method because it is one of the most appropriate and accurate methods used in finding the stability parameter, as the first test was conducted on the pilot sample of (15) players on Sunday, 6/1/2019, then the test was re-applied to the same sample after (7) Days, taking into account the same conditions in which the first test was performed, that is, on Sunday, 1/13/2019, after which the simple correlation coefficient (Pearson) was calculated between the first and second test, as the results showed that the test has a good stability score, as shown below.

**Table (2) shows the reliability of the test results**

Variables	Honesty		Stability		Objectivity	
	T	True Insignificant	T	True Insignificant	T	True Insignificant
Scoring accuracy	0.923	0.00	0.853	0.00	0.931	0.00
Scoring speed	0.975	0.00	0.951	0.00	0.976	0.00
Motor	0.960	0.00	0.922	0.00	0.963	0.00

response speed									
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Insignificance < (0.05) at degree of freedom (14)

Objectivity of the test: it means "the extent to which the judge or examiner is free from subjective factors." Al-Khouli, 1998, p. 227)

The tests used by the researcher are objective, and the reason for this is that it is a quantitative and temporal measurement, so that the judgment cannot change the scores that the laboratory obtains.

The pre-tests were conducted on the research sample (control and experimental) in the police club hall on Thursday 17/1/2019 at exactly (4) in the afternoon under the supervision of the researcher and by the implementation of the assistant work team (and they are specialists), and the conditions were fixed in terms of time, place and tools The method of conducting the test so that the researcher can create the same conditions or approach when performing the post test.

The researcher prepared exercises using the designed device and applied them to the research sample, the experimental work was started on Sunday 20/1/2019 and completed on Thursday 3/28/2019, i.e. for a period of (10) weeks at a rate of (3) units per week. With a total of (30) training units, and the exercises were applied in the main part of the training unit and at a time of (25-35) minutes, the researcher used the principle of graduation in which he gave the exercises, breaks were given between repetitions as well as between groups.

After completing the main experiment, the researcher conducted the post test on Sunday 3/3/2019, taking into account that the conditions are similar to those in the pre-test as much as possible in terms of time, place, tools used, as well as the method of conducting the test.

The researcher used the appropriate statistical methods to process the data obtained through the statistical bag (spss).

**Results:-**

**Table (3) / shows the arithmetic mean, the standard deviation, the calculated (T) value, the true significance, the level of significance, the difference of arithmetic means, and the deviation of the differences in the pre and post tests of the experimental group.**

Variables researched	Unit of measurement	Test Tribal		Test Post		P	P.E.	Value T Calculated	True Insignificant	Level of significance
		Q	P	Q	P					
Scoring accuracy	Degree	2.0000	1.05409	3.9000	.87560	1.90000	.23333	-8.143-	.000	Moral
Scoring speed	Time	3.0520	.34214	2.5750	.45824	.47700	.15619	3.054	.014	Moral
Motor response speed	Time	2.4800	.26721	2.3000	.17404	.18000	.04158	4.329	.002	Moral

Insignificance < (0.05) at degree of freedom (9) and below the level of significance (0.05)

Table (4) / Shows the arithmetic medium, standard deviation, true calculated and Insignificance (T) value, level of significance, difference of computational circles, deviation of differences in tribal and dimensional tests of the control group

Variables researched	Unit of measurement	Test Tribal		Test Post		P	P.E.	Value T Calculated	True Insignificant	Level of significance
		Q	P	Q	P					
Scoring accuracy	Degree	1.9000	.87560	2.7000	.67495	.80000	.20000	-4.000-	.003	Moral

Scoring speed	Time	3.1750	.32857	3.1690	.32885	.00600	.00221	2.714	.024	Moral
Motor response speed	Time	2.5800	.33437	2.5710	.33375	.00900	.00100	9.000	.000	Moral

Insignificance < (0.05) at degree of freedom (9) and below the level of significance (0.05)

Table (5) / Shows the computational medium, standard deviation, true Insignificant (T) value and level of significance in the experimental and control group's dimensional tests

Variables researched	Unit of measurement	Group Experimental		Group The officer.		Value T Calculated	True Insignificant	Level of significance
		Q	P	Q	P			
Scoring accuracy	Degree	3.9000	.87560	2.7000	.67495	3.432	.003	Moral
Scoring speed	Time	2.5750	.45824	3.1690	.32885	-3.330	.004	Moral
Motor response speed	Time	2.3000	.17404	2.5710	.33375	-2.277	.035	Moral

Insignificance < (0.05) at degree of freedom (18) and below the level of significance (0.05)

**Discussion :-**

By observing the results that appeared in the tables above, which showed the development of the experimental group players in the variables studied, the researcher attributes that to the exercises prepared by him, which were applied to the research sample through the designed device, aimed at developing the speed and accuracy of scoring among the players, as it was codified as a sound scientific technique, because the devices have a role in activating the programs according to their diversity, which leads to the speed of decision-making among the players in terms of choosing the correct response in the shortest possible time. "The level of athletic achievement increases rapidly during the use of new exercises that the athlete is not accustomed to, and special doses are used." (Nassif and Hussein, 1988, p.95)

The designed device had a positive role in developing the speed and accuracy of scoring through suspense and creating a spirit of competition between the players, as well as helping them obtain immediate feedback through knowing the results of their performance and continuous correction. As "mastering the good technical performance and advanced movement experiences of the players begins with comprehensive training processes using modern scientific and training methods." (Abd, 2019, p. 107)

Yaroub Khayoun asserts that "feedback appears to be the most powerful variable controlling performance and learning, and it has been evident that there will be no improvement in performance without feedback." (Khayoun, 2010, p.117)

Where "devices are a true measure of the goal of training and effective to achieve the desired objectives in effort and time." (Saeed, 2018, p. 28)

The researcher attributes the development that took place to the players in the speed and accuracy of scoring to the use of the designed device, whose entry into the training is a training variable that stimulates the players' attention and works to motivate them and push them to perform the training duty with great motivation because it is a new training method that has not been accustomed to, which is in harmony with their desires and enthusiasm in developing their performance through competition and suspense, during the training modules.

"The use of training devices and means in the training process has an important role in raising and improving the level of players and serving all sports games, as the devices when training players on them lead to good development and improvement in level." (Abd al-Sattar, 2007, p. 21)

"One of the important features that he should pay attention to in the education process is the principle of suspense and excitement, because any work that a person does can not be mastered if there is excitement or a desire to work." (Ibrahim, 2000, p. 209)

As the repetition in performing the exercises continuously without interruption, and the graduation from it is easy to difficult, it helped players to develop skillful performance in terms of speed and accuracy, as this was the goal of the design of this device, which had a role in the development of the players' ability to perform in optimum skill in terms of speed and accuracy. And (Yaroub Khayun) indicates, "The relationship between speed and accuracy reflects the level of skillful performance. When training on a specific skill, the trainer tries to teach it at a slow speed in order to give a clear idea of how to perform and then tries to increase the speed until it reaches its true speed and try to maintain accuracy. Implementation with accurate performance, this reflects the development and improvement of skill performance." (Gheon, 2010, 43)

Ismail Qasim, quoting (Luiselli K. James), said, "The change in the shapes and types of stimuli in a complex manner leads to the development of the player's skill in terms of speed and accuracy, as the deliberate practice of certain periods is to build fluency (speed and accuracy)." (Jamil, 2012, P. 140)

Muhammad Reda said on (Stamper, 1983) that "even athletes who possess a natural capacity (hereditary) must train very well in order to reach their potential in performing an exercise or a certain skill at high speed." (Rida, 2009, p. 548).

The good level of the players in the skill of the skill needs to be fast and accurate, and on this basis the goal of the researcher was to develop the skill of scoring with speed and accuracy through the designed device, when the researcher started to train the players on the skill of scoring he was at a slow speed in the early stage in order to give a clear and simple idea for how to perform well, but stressed the achievement and development of accuracy during this period, and then the increase in speed begins gradually until it reaches the possible speed of the player's performance and try to maintain accuracy, where it is assumed that it is easier to accelerate the response to the subtle skill is better than correcting the skill inaccurate, if the speed of skill performance increases in conjunction with accuracy, this indicates the development of the skill performance of the players. "Repeating the correct performance of the skill helps to raise its level." (Hammad, 1994, p. 189)

#### **Conclusions: -**

- 1- The exercises prepared by the researcher with the help of the designed electromechanical device contributed to the development of the scoring time and accuracy of the research sample.
- 2- The designed device had a positive impact on developing players through suspense and attractiveness, as well as creating a spirit of competition during performance in the training units.
- 3- The experimental group that trained on the designed device outperformed the control group in the speed and accuracy of scoring, through the statistical results that appeared.

#### **Recommendations: -**

- 1- Training players through an electromechanical device designed because it helps develop speed and accuracy of scoring.
- 2- Attention by coaches during the training units to train speed and accuracy in the skill of scoring.
- 3- Preparing a study by researchers for speed and accuracy of other skills and different samples.
- 4- Paying attention to the use of assistive training devices when training players, as well as adopting modern scientific methods.

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### **Exercises:**

The designed device is placed on the goal and without the wooden board that is placed in front of it, and the player stands in front of it at a distance of (8) m, and aims to be steady towards any one of the squares according to his choice.

The device is on the goal and without the wooden board, it is fixed on the right side, and the player stands in front of him at a distance of (8) m, and aims the ball towards one of the two squares either at the top or the bottom, the exercise is repeated after moving it to the left after completing the required repetitions.

The device is in the middle of the goal and without the wooden board, and the player stands in front of it at a distance of (8) m, the device is moved towards a known side and is required to aim the ball towards one of the two squares either at the top or the bottom. The exercise is repeated after moving it to the left after completing the repetitions Required.

The device is in the middle of the goal without the wooden board, and the player stands in front of it at a distance of 10 meters, the device is moved in an unknown direction, and here the player is required to aim the ball towards the square in which the light is not turned on (opposite to the square that is lit) That is, (for example, if the square above is lit, the desired square will be hit at the bottom).

The device is in the middle of the goal and the wooden board is placed in front of it to block the vision, and the player stands in front of it at a distance of (13) m and the coach is on the line (11) m, the player passes the ball towards the coach to prepare the ball for him, and at this moment the device may move to appear from one side Here, the player is required to aim the ball towards one of the squares, either at the top or the bottom.

The device is in the middle of the goal and the wooden board is placed in front of it to block the vision, and the player stands in front of it at a distance of 12 meters, and an auxiliary wave of the ball is placed in the form of a (crescent) in front of it (intended to help prepare the ball for the player) on a line (10) m, The player passes the ball towards it in order to prepare it for him, and at this moment the device may move to appear from one side, and here the player is required to aim the ball towards the square in which the light was turned on, either at the top or the bottom.

The device is in the middle of the goal and the wooden board is placed in front of it to block the vision, and the player stands in front of it at a distance of 12 m, and the ball wave aid is placed on a line (10) m, and the player passes the ball towards it in order to prepare it for him, and at this moment the device may move to appear From one of the two sides, here the player is required to aim the ball towards one of the top or bottom squares, as the light is turned on in them for

the purpose of increasing the player's stimuli.

The severity used	Group comfort	Groups	Comfort between repetitions	Iteration	Time taken from the unit	Exercise	Section
%80	120/ Tha	3	30 / Tha	8	25 minutes	Number ((1	Main

The device is in the middle of the goal and the wooden board is placed in front of it to block the vision, and the player stands in front of it at a distance of 12 m, and the ball wave aid is placed on a line (10) m, and the player passes the ball towards it in order to prepare it for him, and at this moment the device may move to appear From one side, and here the player is required to aim the ball towards the square in which the light is not turned on (opposite to the square that is lit), i.e. (for example, if the square above is lit, then the required hit the square below).

The device is in the middle of the goal and the wooden board is placed in front of it to obscure the vision, and the player stands in front of it at a distance of (13) m and the coach is on the line (11) m, and a defensive player is added (passive) who is between the coach and the player, as the player passes the ball towards the coach to perform By preparing the ball for him, and at this moment the device may move to appear from one side, and here the player is required to get rid of the defender and aim the ball towards the square that is lit either at the top or at the bottom.

The device is in the middle of the goal and the wooden board is placed in front of it to block the view, and the player stands in front of it at a distance of (13) m and the coach is on the line (11) m, and a defensive player (asked to cut the ball) is added between the coach and the player, as the player passes the ball Towards the coach to prepare the ball for him, and at this moment the device may move to appear from one side, and here the player is required to get rid of the defender trying to cut the ball and aim the ball towards the square in which the light is not turned on (opposite to the square that is lit) i.e. (for example if The square on the top has been lit, so the required hit is the square at the bottom.

Appendix (6) First training unit model from the first week