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# Effect of specific exercises using an innovative device to develop speed and accuracy from movement in soccer players scoring14-15 old-year

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## Abstract

**Objectives.** The current study aimed to identify impact of specific exercises using innovative device (Smart goal) to develop speed and scoring accuracy from movement of soccer players aged 14-15 years.

**Materials and Methods.** where the experimental approach was used to suit the current research, The study was based on an experimental design with two groups experimental and control. The experimental group underwent exercises based on visual and auditory stimuli within an interactive training environment.

**Results.** The results showed that results revealed a significant superiority for the experimental group in post-tests, confirming the effectiveness of sensory-based exercises in developing skill performance. The use of the "smart goal" also demonstrated clear effectiveness in simulating real-world playing conditions and motivating players to make instant decisions, which contributed to improving neuromuscular integration and developing motor-cognitive abilities associated with accuracy and speed of scoring. Improvement rates exceeded 40%, indicating the profound impact of the training program on both mental and physical structures.

**Conclusion.** Based on these results, the research concluded with a set of recommendations, most notably: integrating multi-stimulus exercises into training for emerging age groups, encouraging the use of smart training devices, and training coaches on methods of activating the neuromuscular system through interactive technological means. The study also called for expanding the scope of the study to include different skills and playing positions, and for updating assessment mechanisms by introducing cognitive tests and sensory responses that reflect the nature of modern play. This study represents a qualitative addition to the field of age-group football training and underscores the need to integrate technology and neuroscience into the modern sports training environment.

**Keywords : Exercises, Speed, Scoring Accuracy, Youth, Soccer.**

## Introduction

Football is no longer just a game played around the world. It is a global phenomenon whose influence extends beyond sports, becoming a means of cultural communication, human rapprochement, and the formation of national identity. This popular game has established its presence in various areas of life and has become an arena for scientific and technical development, particularly in the areas of sports training, physical preparation, and field leadership. (Miguel et al., 2021)

This has made it an important focus of ongoing academic research aimed at improving performance and achieving accomplishments. Football carries within it social, cultural, and economic dimensions, and it is the most popular and widespread game in the world (FIFA, 2022). This widespread popularity has prompted scientists and researchers to innovate new training methods and equipment that contribute to the development of the game by improving the efficiency and effectiveness of training, as well as making exercises more exciting and motivating for players.(Banwan shareef, 2020)

The use of modern equipment in training is not limited to the motivational aspect alone. Rather, its impact extends to enhancing accuracy, developing motor response, achieving integration between sensory perception and skill performance, and objectively measuring the level of players' performance before and after the training program. This provides accurate data that helps coaches make decisions based on realistic evidence, contributing to better achievement of training goals. (Rivera-Brown et al., 2022)

Goal-scoring from movement is one of the most important basic skills in football, given its direct impact on match outcomes and overall team performance. This makes it a significant focus of research and development. Based on this, the researcher designed special exercises using an innovative device—the smart goal—to serve as a key element in solving the research problem. To the researcher's knowledge, this device is the first of its kind, serving as a training tool and measuring the speed and accuracy of goal-scoring from movement within a circular environment that simulates the pressure exerted on the player during matches, allowing him to score accurately from different angles of the goal. Specialists have paid great attention to developing basic skills in football, particularly ball sensation and control, as they are the foundation upon which all other skills are built. (Haarnoja et al., 2024)

This research was preceded by important scientific studies, including Breaux (2021) study, which aimed to design an electronic device called (Quality Response) to improve the speed and accuracy of some motor skills for 14-year-old soccer players. The study also used the (Fitlight) and (Quality Response) devices to prepare special exercises, and concluded that the devices were effective in improving the speed and accuracy of complex skills and motor abilities in the experimental group.(Breaux et al., 2021)

Storm (2021) study also highlighted the role of assistive training devices and technologies in raising the level of competition and excitement among players, especially in younger age groups, and reducing feelings of boredom during training. It included the design of a device that measures the speed of motor response to hitting the ball with the head using visual and auditory stimuli and without a stimulus, and it proved its effectiveness as a means of training and measurement, in addition to its development of physical and motor abilities. (Storm et al., 2021)

Through the theoretical review of previous studies, the scientific and applied importance of this research was reinforced, and the literature emphasized the necessity of using modern devices and tools to develop the physical and skill abilities of football players, especially in the younger age groups. Scoring skills from movement, control, and mastery of the ball with the foot and head are fundamental pillars of football players' skill performance, particularly in the younger age groups, where the player's technical, physical, and psychological foundations are built.(Méndez-Dominguez et al., 2022)

Through his work as a coach and supervisor of sports activities at the Ministry of Education, the researcher observed a clear weakness in the performance of these skills among players in specialized centers up to 60% according to periodic tests conducted by the training staff of the specialized school, This can be attributed to several reasons, most notably: the lack of reliance of training programs on specific exercises that focus on taming and goal-scoring skills from movement, and the weak connection between training and the kinetic reality of matches. Recent

studies have also revealed shortcomings in the use of modern devices and technologies that enhance the effectiveness of training and contribute to developing players' motor response speed and skill accuracy.(Kabacinski et al., 2022)

This deficiency has led to slow skill and technical development, and a lack of the sensory and neurological challenges that young players need to reach advanced levels of performance. Hence, the researcher sensed an urgent need to design a special training program based on specific exercises using an innovative device (smart goal). This program is directed at developing the neuromuscular system, given its effective impact on improving scoring accuracy from movement, enhancing the ability to control and dominate the ball, and developing complex motor responses among young soccer players within the specialized centers affiliated with the Ministry of Education.

This approach was based on the observations generated by field experience, and on what educational and sports literature has confirmed regarding the importance of targeted exercises supported by modern technologies in developing skill performance among young age groups.

The study aims to:

1. Develop special exercises based on an innovative device to develop the speed and accuracy of goal-scoring from movement among soccer players aged 14–15 years.

2. Identify the effect of using the innovative device on developing motor response speed during the skill of goal-scoring from movement.

3. Measure the extent of improvement in goal-scoring accuracy from movement after implementing specific exercises using the innovative device.

4. Compare the results of pre- and post-tests to determine the effectiveness of the training program using the innovative device.

The researcher assumes that there are statistically significant differences between the results of the pre- and post-tests in the speed of scoring from movement in favor of the post-tests, and that the exercises using the innovative device have a positive effect in developing the speed and accuracy of scoring from movement among football players.

## Research Methodology

The researcher used the experimental approach because it suited the nature of the research problem, and used a design method that involved both control and experimental groups (pre-test and post-test). This method is "the most accurate method for testing hypotheses and cause-effect relationships, and for providing reliable results". (Majed, 2022)

The research population consisted of players from the Specialized Center in the Baghdad-Rusafa Third Education Directorate, in the junior category (born in 2011), aged (14) years, totaling (58) players who participated in the school tournament held by the Sports and Scouting Department in (2024). The research sample, consisting of (48) players, was selected and distributed over two stages of the research.

In the first phase, the entire sample (48 players) was used to construct a "smart goal" device test designed to measure motor response speed without a stimulus and with an auditory or visual stimulus. The test results were statistically analyzed for validity, reliability, objectivity, and normal distribution. In the second phase, (48) players were selected from the same research community and divided into two equal groups:

The experimental group: (24) players, randomly selected by lottery, underwent a training program using the designed device. The control group: (24) players, continued their usual training without using the device. "This distribution is methodologically appropriate for achieving the research objectives and ensuring the accuracy of the results". (Sumantri et al., 2023)

It also provides the results with an acceptable degree of reliability and generalizability. Methodological studies indicate the importance of selecting a sufficient sample size to ensure statistical power, as "sample size can significantly affect the results and their statistical significance".(García-Buendía et al., 2024) (7) Players were excluded for participating in the pilot study, and (3) Players were excluded for no other reason.

The research sample is "the part that represents the original community and on which the researcher conducted entire work".(Wilk et al., 2024) The research sample numbered (48 Players) out of the original community of (58 Players), representing (82.76%), as shown in Table No. (1).

Table 1.

| Research community | Research sample | Experimental group | Control group | Exploratory group | Excluded group |
|---|---|---|---|---|---|
| 58 | 48 | 24 | 24 | 7 | 3 |

Research sample equivalence:

The research sample was divided into two groups, an experimental and a control, by drawing lots. The statistical package (SPSS) was used to determine the equivalence of the two groups in terms of body measurements before applying the specific exercises, as shown in Table (2).

Table 2.

| No. | Body Measurements | Calculated T-value | Significance value | Significance Level |
|---|---|---|---|---|
| 1 | Height | 1.753- | 0.06 | Insig. |
| 2 | Mass | 1.237- | 0.173 | Insig. |
| 3 | Age | 0.511 | 0.432 | Insig. |

Table 3.

Sample equivalence in the pre-tests for the two groups (experimental and control)

| No. | Tests | Measurement unit | Experimental group | | Control group | | Significance level | Calculated (T) value | Significance of differences |
|---|---|---|---|---|---|---|---|---|---|
| | | | Mean | St.d | Mean | St.d | | | |
| **1** | Motion scoring response to a light stimulus | Degree | 0.363 | 0.047 | 0.467 | 0.032 | 0.351 | 0.860 | Insig. |
| **2** | Motion scoring response to | Degree | 0.082 | 0.013 | 0.098 | 0.007 | 0.512 | 0.676 | Insig. |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | an audio stimulus | | | | | | | | |
| **3** | Motion scoring response to an unstimulated stimulus | Degree | 0.323 | 0.018 | 0.236 | 0.0237 | 0.801 | 0.291 | Insig. |

Degree of freedom (46) under error level (0.05)

*The Designed Device (Smart Goal)*

The device was designed by the researcher to achieve the research objectives of measuring and training the speed of motor response to goal-scoring skills in soccer players, using audio-visual stimuli without a stimulus. The device aims to develop accuracy in goal-scoring from movement in an environment similar to actual performance on the field, enhancing players' ability to respond to stimuli quickly and accurately. The device also contributes to improving ball sense and control by identifying a narrow scoring space, simulating the defensive pressures faced by the opposing team during a match.

*Testing Method*

The device is installed on a legal goal, and the player stands within a circle with a diameter of 2 meters and a distance of 11 meters from the goal. The test begins with the player turning on the device, performing a dribbling skill for 20 seconds. During this time, one of the device's four lights, mounted on the corners of the goal, glows, and the player shoots from the corner from which the visual stimulus originated.

On the second attempt, the dribbling time is increased to 30 seconds, and another light glows randomly, and the player shoots from the corner from which the visual stimulus originated.

On the third attempt, the dribbling time is 25 seconds, and the player shoots from the corner from which the visual stimulus originated.

On the fourth attempt, the visual stimulus glows for 35 seconds, and the same attempt is repeated.

On the fifth attempt, the dribbling time is 40 seconds, and the shot is made from the corner from which the visual stimulus originated.

*First Test*

Test Name: Test to Measure the Speed of Response and Accuracy of Scoring from Movement Without Stimulus

Purpose of the Test: To measure the speed of response and accuracy of scoring from movement without stimuli

Materials Used: Scoring Response Speed Measuring Device

The device is installed on a legal goal, and the player stands marked by a circle with a diameter of 2 meters and a distance of 11 meters. The test begins with the device turned on. The examiner (player) performs the dribbling skill for 20 seconds. One of the device's four lights, installed at the corners of the goal, glows, and the player shoots at the corner from which the visual stimulus emanated. On the second attempt, the dribbling time is increased to 30 seconds. Another light glows

randomly, and the player shoots at the corner from which the visual stimulus emanated. On the third attempt, the dribbling time is 25 seconds, and the player shoots at the corner from which the visual stimulus emanated. On the fourth attempt, the dribbling time is 35 seconds, and on the fifth attempt, the time is 40 seconds.

Scoring:

* The player is allowed five attempts, with each attempt being awarded (2) points. The total possible points for the test is 100. (10) points.

* If a player shoots the ball toward the specified corner that represents the correct (precisely defined) location, he is awarded (2) points.

* If a player misdirects and does not shoot the ball toward the specified corner, he is awarded (0) points.

* If a player steps outside the circle or the ball falls during the attempt, the attempt is considered a failure and the player is awarded (0) points for that attempt.

*Test Two*

Test Name: Motion-Based Response and Accuracy Test Using Auditory Stimulus

Purpose of the Test: To measure the response speed and accuracy of motion-based scoring based on an auditory stimulus.

Materials Used: A device for measuring response speed and accuracy of scoring (smart goal).

Test Method: The device is installed on a legal goal. The player stands within a circle with a diameter of 2 meters and a distance of 11 meters from the goal. The test begins with the player turning on the device, and the player performs a dribbling skill for 20 seconds. During this period, a loudspeaker installed near the player emits a sound indicating a specific color, which corresponds to one of the colors fixed on the corners of the goal. The player shoots the ball toward the corner whose color coincides with the sound.

In the second attempt, the dribbling time is increased to 30 seconds, and another sound is randomly played indicating a different color. The player shoots toward the corner whose color coincides with the sound.

In the third attempt, the dribbling time is increased to 25 seconds, and the player shoots toward the corner whose color coincides with the sound. In the fourth attempt, the visual stimulus glows for 35 seconds, while in the fifth attempt, the dribbling time is increased to 40 seconds, and the player shoots toward the corner whose color corresponds to the sound emitted.

Scoring:

* The player is allowed five attempts, with each attempt being awarded (2) points, and the total possible points for the test is (10) points.

* If the player shoots the ball toward the designated corner representing the correct (precisely defined) location, they are awarded (2) points.

* If the player misdirects and does not shoot the ball toward the designated corner, they are awarded (0) points.

* If the player steps outside the circle or the ball falls during the attempt, the attempt is considered a failure and the player is awarded (0) points for that attempt.

*Test Three*

Test Name: Test to Measure the Speed and Accuracy of Movement-Based Goal-Response to a Visual Stimulus

Purpose of the Test: To measure the speed and accuracy of movement-based goal-recognition based on a visual stimulus.

Materials Used: A device to measure the speed and accuracy of movement-based goal-recognition (smart goal).

Test Method: The device is installed on a legal goal. The player stands within a circle with a diameter of 2 meters and a distance of 11 meters from the goal. The test begins with the device being turned on, and the player performs a dribbling skill for 20 seconds. During this time, one of the device's four lights, mounted on the corners of the goal, glows. The player shoots the ball toward the corner from which the visual stimulus originated.

In the second attempt, the dribbling time is increased to 30 seconds, another light is randomly lit, and the player shoots toward the corner from which the visual stimulus originated.

In the third attempt, the dribbling time is increased to 25 seconds, and the player shoots toward the corner from which the visual stimulus originated. On the fourth attempt, the visual stimulus glows for 35 seconds, while on the fifth attempt, the dribbling time is increased to 40 seconds, and the player shoots at the angle from which the visual stimulus originated. As explained in:

Scoring:

* The player is allowed five attempts, with each attempt being awarded (2) points, and the total possible points for the test is (10) points.

* If the player shoots the ball toward the specified angle representing the correct (precisely defined) location, they are awarded (2) points.

* If the player misdirects and does not shoot the ball toward the specified angle, they are awarded (0) points.

* If the player steps outside the circle or the ball falls during the attempt, the attempt is considered a failure, and the player is awarded (0) points for that attempt.

*First pilot study*

The researcher conducted a pilot study on Friday, March 22, 2024, on a random sample of (7) players from the research community. This study aimed to determine the suitability of the equipment used, identify technical difficulties, the efficiency of the support team, and the sample's response.

*Second pilot study*

On Saturday, April 27, 2024, the researcher conducted a pilot study on a random sample of (9) players from the research community. This study aimed to determine the intensity and duration of certain exercises (maximum intensity level and heart rate level were determined to determine the suitability of the exercises and the method of separating the control group from the experimental group).

*Post-tests*

Discriminant validity of the test:

The test was administered to all sample members, totaling (58) players. The researcher arranged the test results on the device in descending order, taking (27%) of the results of (15) players as the highest values, and (27%) of the results of (15) players as the lowest values, to determine the test's ability to distinguish between the high-level group and the low-level group. The data were statistically processed using the SPSS program to determine the level of significance and the (t) value, using (t) for independent samples (differences between two groups). The results were statistically significant, as shown in Table (4).

Table 4.

Discriminant validity

| No. | Tests | T-value | Significance level | Statistical significance |
|---|---|---|---|---|
| **1** | Motion scoring response to a light stimulus | 11.77 | 0.00 | Sig. |
| **2** | Motion scoring response to an audio stimulus | 7.66 | 0.00 | Sig. |
| **3** | Motion scoring response to an unstimulated stimulus | 20.08 | 0.00 | Sig. |

Test Reliability:

The reliability and consistency of test results when applied more than once under similar conditions. The researcher administered the test and reapplied it to the research community five days later. The Pearson correlation coefficient and significance level were calculated using the statistical package (SPSS). The results appeared at a significance level of (0.05), which is significant and highly correlated. Table (5) shows the test reliability results:

Table 5.

| No. | Tests | T-value | Significance level | Statistical significance |
|---|---|---|---|---|
| **1** | Motion scoring response to a light stimulus | 0.88 | 0.00 | Sig. |
| **2** | Motion scoring response to an audio stimulus | 0.95 | 0.00 | Sig. |
| **3** | Motion scoring response to an unstimulated stimulus | 0.91 | 0.00 | Sig. |

Objectivity is one of the fundamental foundations of scientific research. It means that the researcher must be unbiased throughout all stages of their research. Research results must be logical and independent of the researcher's opinions and beliefs, regardless of who conducted the test. Subjective judgments must be excluded from the test. A test is considered objective if it yields the same scores, even if the test conditions and the tester change).(Parraca et al., 2022) Based on the results of the two judges the researcher consulted, correlation results for both judges were calculated using the statistical package (SPSS), using Pearson's correlation coefficient. Table (6) shows the results of the test's objectivity:

Table 6.

| No. | Tests | T-value | Significance level | Statistical significance |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **1** | Motion scoring response to a light stimulus | 0.86 | 0.00 | Sig. |
| **2** | Motion scoring response to an audio stimulus | 0.91 | 0.00 | Sig. |
| **3** | Motion scoring response to an unstimulated stimulus | 0.910 | 0.00 | Sig. |

(*) Below the significance level (0.05) and with a degree of freedom of (24)

Test Difficulty Level

The scientific conditions required by the test results and their suitability for the study sample were demonstrated. These conditions indicated (the testers' levels of test difficulty, the tendency of test scores toward moderation (normal distribution), and that test results should not be clustered at a single level) (Gómez, 2022). The skewness coefficient used by the researcher was between the level of the normal curve for the research sample, which is closer to the normal distribution. Table (7) shows the normal distribution of the tests.

Table 7.

| No. | Tests | Measurement unit | Mean | Standard Deviation | Median | Skewness Coefficient |
|---|---|---|---|---|---|---|
| **1** | Motion scoring response to a light stimulus | Degree | 0.405 | 0.045 | 0.429 | 0.291 |
| **2** | Motion scoring response to an audio stimulus | Degree | 0.089 | 0.0219 | 0.075 | 0.231 |
| **3** | Motion scoring response to an unstimulated stimulus | Degree | 0.213 | 0.018 | 0.204 | 0.733 |

N = 40

*Pre-tests*

The pre-tests were conducted for the research sample at 3:30 p.m. at Natiq Hashim Stadium. The researcher carefully controlled and established the conditions related to the tests, the equipment and tools used in the tests, and the support team to control any potential variables during the post-tests, which were conducted as follows:

The motor response speed and scoring accuracy tests were conducted for the experimental and control groups on Friday and Saturday, March 1-2, 2024.

*Special Exercises*

The researcher prepared specific exercises for scoring skills (sense and control of the ball, reaction speed, visual perception, shooting in tight spaces, shooting under pressure from defenders, shooting from different positions, shooting after quick passes, shooting from varying distances, shooting with the instep of the foot, dribbling and shooting, and shooting under time pressure). The researcher ensured that the exercises resembled playing and avoided the monotony of boredom. This was achieved by using the innovative device - the smart goal - to measure the speed of motor response to scoring skills. To achieve the research objectives, the exercises were administered to the experimental group by the assistant team and under the supervision of the researcher. The researcher did not intervene in the exercises of the control group. The researcher relied on his experience and scientific sources as follows:

-Duration of the exercises (8) weeks

-Number of training units (24), with the first training unit being on Saturday, August 8, 2024, and the last training unit on May 5, 2024. Saturday, three training sessions per week: Saturday, Monday, and Wednesday.

-Intensity (70-85% of maximum effort)

-High-intensity interval training method
- Total number of exercises: 102

*Post-tests*

After completing the exercises designed by the researcher on Saturday, June 1, 2024, the post-tests were conducted. After the researcher completed the exercises he designed for the experimental group, he conducted post-tests for both the experimental and control groups to measure the results. He took into account all the conditions that accompanied the pre-tests.

Statistical Methods

The researcher used the statistical package (SPSS). The following criteria were used: arithmetic mean, median, skewness coefficient, Pearson's correlation coefficient, standard deviation, t-test for independent uncorrelated samples, and t-test for independent uncorrelated samples.

**and Results Discussion**

Displaying the results of the pre- and post-tests for the experimental group.

Table 8.

shows the results of the pre- and post-tests and the percentage of development in the research variables for the experimental group

| Skill Tests | Measurement Unit | Pre-test | | Post-test | | Difference of means | (F) value | Calculated T. value | significance value | Sig Significance | Development rate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | St.d | Mean | St.d | | | | | | |
| Motion scoring response to a light stimulus | Degree | 0.477 | 0.026 | 1.196 | 0.132 | 0.712 | 0.034 | 17.28 | .000 | Sig. | 161.42 |
| Motion scoring response to an audio stimulus | Degree | 0.083 | .0130 | 0.201 | .0150 | .1540 | 0.109 | 14.23 | .000 | Sig. | 118.49 |
| Motion scoring response to an unstimulated stimulus | Degree | 0.212 | .0220 | 0.613 | .0210 | .1970 | 0.032 | 21.43 | .000 | Sig. | 124.26 |

N = (10) under significance level (0.05) and degree of freedom (9)

Discussion of pre- and post-tests for the experimental group

By presenting the results of the differences between the pre- and post-tests for the research variables for the experimental group in Table (8), which shows that there is a significant effect on the test

results in favor of the post-tests, with a development rate ranging from (161.42 - 118.49%). In the motor response speed test for the skill of scoring from movement with a visual stimulus, the difference was significant in favor of the post-test, with a development rate of (161.42%).

The arithmetic mean, standard deviation, calculated (t) value, and significance for the pre- and post-tests for the response speed for the technical performance of the skill of scoring from movement with a visual stimulus. The researcher attributes the reason for the development to the specially designed exercises and the researcher's use of the innovative device (the smart goal), as the latter targeted sensory stimuli (visual and auditory) that suddenly appear in different angles of the goal, which motivated the players to respond quickly and accurately to a changing (visual) stimulus.

The special exercises using devices and training tools and methods that have a positive impact on developing the speed of motor response and the speed of performing football skills.(Qutaiba Younus, 2021)

They are similar to real-life playing situations, as the device was designed to be a semi-realistic training environment, as it imposed immediate challenges on the player that required a quick motor decision, which was reflected in the efficiency of the motor neuron response, and created an interactive and changing environment that made the player ready to make quick decisions in a specific time and immediate feedback, as the device gives direct feedback to the player and the coach about the response time and the scoring location, which helped in the immediate evaluation and modification of performance. (Thompson et al., 2022)

The researcher also adopted the training method in designing the exercises that lasted (8) weeks at a rate of (3) training units per week, targeting the development of the speed of motor response for the scoring skill with only a visual stimulus, then only an auditory stimulus, and without the last stimulus to provide moral motivation and increase the number of repetitions to form the motor program in the central nervous system, and the motor neuron coordination for the skill of scoring from movement, with special compound exercises (stimulus + movement + decision + implementation).

The researcher relied on principle of gradual increase in the intensity of the training load and the work ratio (1-3), the researcher started the exercises with specific stimuli and a relatively easy time period, and gradually became complex and multiple stimuli to increase the challenge. It is the result of applying the exercises using the innovative device (smart goal), as the exercises were designed in a way that focuses on scoring techniques from movement, and the researcher modified the stimuli in each stage of the exercise to stimulate the players' response gradually and in a wavy way that increased the effectiveness of the exercises.

The players in the experimental group showed a response to the innovative device (smart goal), as the visual and auditory stimuli helped improve their ability to react more quickly to different playing situations. This is what Ihsan (2023) indicated (the use of rapid response devices and motor simulation contributes directly to increasing the speed of motor response and improving the accuracy of scoring, by stimulating the motor nervous system and improving the player's motor coordination).(Ihsan et al., 2023)

The researcher sees the necessity of using special exercises using training methods, devices, tools and auxiliary means due to their positive impact on developing the speed and accuracy of scoring from movement and the speed of performing football skills.

Displaying the results of the pre- and post-skill tests for the control group

Table 9.

Shows the results of the pre- and post-tests and the percentage of development in the research variables for the control group

| Skill Tests | Measurement Unit | Pre-test | | Post-test | | Difference of means | (F) value | Calculated T. value | significance value | Sig Significance | Development rate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | St.d | Mean | St.d | | | | | | |
| Motion scoring response to a light stimulus | Degree | 0.466 | 0.042 | 0.613 | 0.0677 | 0.137 | 0.013 | 4.701 | .000 | Sig. | 27.35 |
| Motion scoring response to an audio stimulus | Degree | 0.078 | 0.018 | 0.103 | 0.005 | 0.012 | 0.005 | 3.174 | .000 | Sig. | 23.71 |
| Motion scoring response to an unstimulated stimulus | Degree | 0.219 | 0.023 | 0.262 | 0.012 | 0.037 | 0.008 | 3.706 | .000 | Sig. | 15.92 |

Discussion pre- and post-tests for the control group

By presenting the results of the differences between the pre- and post-tests for the research variables for the control group in Table (9), we demonstrate a significant effect on the test results, in favor of the post-tests, with a development rate ranging from (27.35 - 15.92%) in the motor response speed test for the skill of scoring from movement with a visual stimulus. This indicates a slight significant difference between the results of the two tests, in favor of the post-test, which was not at the same level compared to the experimental group.

The researcher attributes the limited difference in the development rates of the control group members between the pre- and post-tests to their commitment to a traditional training program that did not include specific exercises directed using the "smart goal" - the innovative device - which explains their slow developmental pattern. In contrast, the experimental group, which underwent a special exercise program designed by the researcher, showed significant improvements in motor response speed and scoring accuracy, indicating the effectiveness of exercises based on sensory, auditory, and visual stimulation in developing skill capabilities.

This trend is consistent with what Shareef (2025) indicated, as they demonstrated that training programs that employ modern technological methods and tools lead to better activation of the neuromuscular system, which is reflected in overall skill performance.(Shareef, 2025)

Christiani (2021) also confirmed that incorporating specific exercises designed according to the player's requirements contributes to accelerating the pace of physical and skill development more than traditional training methods. (Christiani et al., 2021)

The control group's reliance on a curriculum that did not focus on diverse sensory stimuli in its exercises negatively impacted the development of scoring speed and accuracy, unlike the experimental group, which was influenced by the designed exercises and the use of an innovative device that stimulated the central nervous system, increasing the effectiveness of the exercises and skill mastery in the experimental group. Karasievych and Abdul Majeed (2020) indicated that "the

use of innovative training methods enhances the efficiency of motor performance by stimulating multiple senses, which in turn increases the effectiveness of exercises".(Karasievych et al., 2021)

Miguel (2021) believe that "training using diverse stimuli (auditory and visual) leads to improved sensory perception, thus developing motor response speed in complex skill activities".(Miguel et al., 2021) Despite the significant differences, the rates of improvement were limited when compared to the experimental group, which underwent specific exercises using an innovative device manufactured by the researcher. This reinforces the importance of the designed exercises and their direct impact on improving the efficiency of motor performance in the scoring skill.(Borges et al., 2022)

Presentation of the results of the post-tests for the experimental and control groups.

After the researcher completed the presentation and discussion of the results of the pre- and post-tests for both the experimental and control groups separately, he moved on to analyze the comparative results between the two groups, relying on the data contained in Table (10). This was done to extract the essential differences and interpret them in light of the research objectives and data.

Table 10.

shows the arithmetic means, standard deviations, calculated t-value, sig score, and significance for the post-skill and strategic tests for the experimental and control groups

| Skill Tests | Measurement Unit | Pre-test | | Post-test | | Calculated T. value | significance value | Sig Significance |
|---|---|---|---|---|---|---|---|---|
| | | Mean | St.d | Mean | St.d | | | |
| Motion scoring response to a light stimulus | Degree | 1.013 | 0.106 | 1.567 | 0.053 | 12.48 | .000 | Sig. |
| Motion scoring response to an audio stimulus | Degree | 1.359 | 0.035 | 1.851 | 0.937 | 14.62 | .000 | Sig. |
| Motion scoring response to an unstimulated stimulus | Degree | 1.479 | 0.091 | 1.921 | 0.098 | 11.77 | .000 | Sig. |

(*) Degree of freedom = 46, and significance level 0.05

Discussion post-tests for the experimental and control groups

By presenting the results of the post-tests for the research variables for both the experimental and control groups, the differences resulting from the impact of the adopted training program become clear. This allows for a comparative analysis to reflect the effectiveness of the experimental treatments used.

The results of the three motor response speed tests (with visual, audio, and without stimulus) indicate a tangible improvement in the accuracy of movement scoring among the players in the experimental group. The researcher attributes this development to the close link between the speed of motor response and the efficiency of performing the scoring skill. Naturally, processing sensory stimuli quickly and the precise motor response are among the basic determinants of scoring accuracy in football. This was confirmed by Umamaheswari et al. (2024), who believe that "a player who has a quick motor response is more able to adapt his performance to sudden situations within the penalty area, which contributes to directing the ball accurately towards the appropriate angles of the goal".(Umamaheswari, 2024)

The researcher agrees with what Lloyd et al. (2015) stated that scoring accuracy is positively related to the ability to make quick decisions and motor preparation in crucial moments, especially in dynamic situations. (Lloyd et al., 2015)

The researcher relied on exercises with various stimuli (visual and auditory) that stimulated the brain to activate the neural pathways associated with motor sensing and precise control of the ball's direction and force, which is reflected in researcher confirmed that the designed exercises have succeeded in enhancing the integration of the neuromuscular system with sensory processes, which led to a qualitative improvement in the skill performance of the players, especially in situations that require high accuracy and instant decision-making. The exercises using the innovative device (smart goal) adopted by the researcher have contributed effectively to developing the speed and accuracy of scoring from movement among football players in the experimental group, using different types of stimuli (visual, auditory).

## Conclusions

In light of the research objectives and hypotheses, and in accordance with the results of the statistical processing of the tests, the following conclusions were reached:

1. The experimental group demonstrated a clear superiority in the post-test results of the skill of scoring from movement, compared to the control group. This demonstrates the effectiveness of special exercises based on visual and auditory stimuli in accelerating motor response and improving scoring accuracy.

2. Integrating sensory stimuli (visual and auditory) within an interactive training environment enhanced the players' neuromuscular integration and contributed to the activation of immediate decision-making centers, which directly impacted the quality of skill performance in real-world game situations.

3. The innovative device (the smart goal) proved its effectiveness as an effective training tool in developing sensorimotor abilities associated with shooting, by providing real-time stimuli that simulate the reality of the match and prompt the player to adapt immediately to the game's variables. 4. The improvement in development rates (which exceeded 40% in all tests) indicates that the designed exercises did not only target the skill in its mechanical form, but also engaged the associated cognitive and brain structures.

5. Relying on traditional exercises (as in the control group) was not sufficient to produce qualitative changes in scoring accuracy, which reinforces the need for training models based on modern theories in kinesiology and sports neuroscience.

## Recommendations

1. Adopting specific exercises based on multiple stimuli within training modules for young age groups, given their effective impact on accelerating motor response and improving scoring quality.

2. Encouraging the use of innovative devices in training programs, along with developing similar locally manufactured devices that simulate the real-life playing environment and integrate multiple senses, brings training closer to match requirements.

3. The necessity of training coaches on modern methods of activating the neuromuscular system through scientific workshops based on motor technology and interactive stimuli, to enhance the quality of qualitative training.

4. Expanding the scope of future research to include different age groups and players from various playing positions, to determine the extent to which the device and exercises affect broader skill situations (such as receiving and passing, dribbling, and defensive coverage).

5. Incorporating new cognitive and sensory response tests into the evaluation process, and moving beyond traditional skill tests, as modern sports performance is no longer based solely on movement, but also on perception and quick decision-making.

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