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THE EFFECT OF AN EDUCATIONAL PROGRAM ON DEVELOPING SENSORY PERCEPTION, MOTOR COORDINATION, AND HANDBALL SHOOTING ACCURACY FOR MAYSAN CLUB YOUTH

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ABSTRACT

The purpose of this study was to investigate the effectiveness of a structured educational program in enhancing sensory perception, motor coordination, and throwing accuracy in adolescent handball players. The researcher adopted an experimental methodology involving 16 participants, who were equally assigned to two groups: an experimental group and a control group, both comprising young athletes from Maysan Club. An exploratory pilot study was initially conducted using suitable research tools and measurement instruments. This was followed by a pre-intervention assessment, after which the experimental group engaged in a learning intervention consisting of three training sessions per week over a period of eight weeks. Upon completion of the program, a post-intervention test was administered. The collected data were analyzed statistically and interpreted in detail. The study's findings indicated that the educational program significantly improved sensory perception, motor coordination, and shooting accuracy in handball among participants in the experimental group. These enhancements contributed to better performance and a reduction in technical errors. Based on these outcomes, the researcher recommended incorporating a variety of exercises into the training curriculum to support the development of cognitive and motor skills among young athletes in the Maysan Club handball team.

Keywords: *Educational, sensory perception, motor coordination and handball.*

INTRODUCTION

Handball is a team sport that requires a comprehensive set of skills, including physical fitness, motor skills, mental preparation, and manual dexterity. These elements are essential to ensure optimal performance, especially given the game's high technical precision, particularly in throwing skills. Therefore, players and coaches must take these skills into consideration when designing and implementing training programs to contribute to the continuous improvement of performance.

Among these skills, sensory perception is particularly important, as it plays a pivotal role in a player's interaction with the ball, their teammates, and opposing players. This perception includes determining the appropriate location, timing, and force to perform the skill. Motor coordination is also a prerequisite for effective handball practice, especially when dealing with changing situations during matches, which require quick and sound thinking. Therefore, a player's sensory perception and effective motor coordination directly contribute to the proper application of various motor skills.[1]

Perception and sensation processes are built on the accumulation of theoretical and applied experience and knowledge, which helps the player distinguish between relevant stimuli in the field and ignore unimportant ones, thus achieving a high degree of motor coordination. [2]This coordination enhances the player's ability to execute throwing skills accurately and efficiently. Hence, the importance of this research is evident in highlighting the effectiveness of the educational program applied to a group of youth players at the Maysan Handball Club, with the aim of identifying its impact on developing levels of sensory perception, motor coordination, and accuracy in executing the throwing skill.

RESEARCH PROBLEM

Through field observation and practical experience on handball courts, researchers realized the importance of studying the skills of sensory perception, motor coordination, and shooting accuracy of youth players at Maysan Handball Club. It was found that coaches did not pay sufficient attention to using appropriate educational tools that contribute to developing these abilities. It usually involved a limited set of skills in working with a ball or with a more restricted set of traditional instruments with no varied stimulating devices. This was not pleasing to the eyes of the players to have a clear perception and awareness of the environment surrounding one when playing the game.

More than that, the researchers reported the lack of motor coordination skills among the players, as well as low enthusiasm and motivation during the training process. In this study the use of educational tools in the training process can be seen as particularly significant when applied to young people, as the definite effect of these tools on the enhancement of the precision of the shooting performance results, which is essentially the indicator of the degree of sensory perception and motor coordination in a given player.

RESEARCH OBJECTIVES

1. To design a learning program to attain sensory-perception development, motor-coordination, and shooting handball accuracy among the young men in Maysan Club.
2. To find out how the educational program affected the process of developing sensory perception and motor coordination that are involved in handball among young Maysan Club men.
3. The effect of visual stimuli educational program on the accuracy of handball shooting in young men of Maysan Club.

RESEARCH HYPOTHESES

1. The instructional course is good in as far as it lays ground to sensory perception and motor coordination in young men handball players related to Maysan Club.
2. The impact of the educational program is positive when it comes to training the accuracy of shooting handball in young men participating in Maysan Club.

RESEARCH AREAS

- Human Area: Young men's handball players aged 14-16 years from Maysan Club.
- Time Area: From October 1, 2024 to May 31, 2025.
- Spatial Area: Maysan Club.

RESEARCH METHODOLOGY

The researcher chose experimental type because of nature of the study and also because equivalent group design was used which is regarded as one of the best designs to study effect of specific training or educational programs on the researched groups.

RESEARCH POPULATION AND SAMPLE

The defines the population of the researched group including 30 individuals, who are young players in the Maysan Handball Club aged between 14 and 16. From this population, a sample of 16 players was selected to represent the research sample. These players were divided equally into two groups: an experimental group and a control group, representing 53.33% of the original population.

SAMPLE HOMOGENEITY AND GROUP EQUIVALENCE

1. Sample Homogeneity: The researcher conducted a homogeneity process among sample members according to several relevant variables, including age, height, and weight, with the aim of controlling for any influencing variables that might affect the research results. Appropriate statistical measures, such as the arithmetic mean, standard deviation, mode, and skewness coefficient, were used to measure the degree of homogeneity among sample members, as shown in Table (1).

Table (1): Show means, standard deviations, mode, and skewness coefficient for the research sample homogeneity variables

Variables	Mean	Std	Mode	Skewness
Chronological age/year	14.56	0.54	15	0.19
Height/cm	167.81	4	166	0.86
Weight/kg	68.6	3	67	0.54

"The results of Table (1) show that the values of the skewness coefficient range between (±1), indicating that the data are free of non-normal distribution defects, which indicates the homogeneity of the research sample".[3]

EQUIVALENCE TESTING OF THE TWO GROUPS IN SELECTED PRETESTS

Before beginning the research experiment, the researcher conducted an equivalence test between the experimental and control groups to verify the homogeneity of the two groups on some pretest variables relevant to the study topic. An independent samples t-test was used to compare the means and standard deviations of the two groups' scores on these variables, ensuring there were no statistically significant differences that might affect the study results. The test results reflect the equivalence of the two groups in pretest performance, confirming the validity of the experimental design, as shown in Table (2).

Table (2): Show means, standard deviations, and t-test values between the experimental and control groups on some pretest variables.

Variables	Control		Experimental		(t) value	Type of indication
	Mean	Std	Mean	Std		
Perception of throwing a ball/number	4.04	1.89	3.88	1.86	0.22	Not sig.
Perception of time/second	0.75	0.13	0.68	0.13	1.12	Not sig.
Eye-leg coordination/second	7.25	2.41	8.08	1.28	0.52	Not sig.
Eye-arm coordination/number	8.86	1.34	8.22	1.44	0.22	Not sig.
Shooting from a standstill/number	3.88	1.12	3.58	1.21	0.32	Not sig.

The results of Table (2) show that the calculated values of the (t) test were less than the table value of (2.16) at a significance level of (0.05) and a degree of freedom of (14). This indicates that there are no statistically significant differences between the experimental and control groups in the selected pre-variables, which confirms the fulfillment of the equivalence condition between the two groups before the start of implementing the educational program, and enhances the integrity of the experimental procedures and the reliability of subsequent results.

DEVICES AND TOOLS USED

1. **Research Methods:** The researcher employed a combination of research methodologies, including both Arabic and international sources of data, in addition to utilizing various tools such as standardized tests, quantitative and qualitative measurements, direct observations, structured interviews, and survey questionnaires.
2. **Tools and Devices:** The researcher used the following tools and devices (a measuring tape, an adhesive tape, an eye patch, (15) legal handballs, signs, flags, a (3) stopwatch, multiple ropes, a weighing device, a handheld electronic calculator, a camera, CD-ROMs, and a laptop computer).

DEFINING RESEARCH VARIABLES

1. **Educational Methods:** Following an in-depth review of scientific literature and previous studies in the fields of handball and sports training, a variety of visual stimuli—such as still images, sequential photographs, video recordings, model demonstrations, computer-based presentations, and data show tools—were identified as the most effective means to support the objectives of the current study. These methods were specifically selected to enhance the participants' sensory perception, motor coordination, and shooting accuracy in handball, in alignment with the characteristics and needs of the study sample. The decision to focus on this particular skill stemmed

from its engaging nature, the athletes' competitive enthusiasm, their motivation to improve scoring performance, and the strong desire to learn, all of which justified its inclusion as a central component of the research.[3]

EQUIPMENT AND TOOLS

- **Tools:**

1. Handball court .
2. (10) handballs.
3. (15) markers.
4. Office supplies (stationery), chalk.
5. (50) m metric measuring tape.
6. (4) CDs.
7. (1) Flash memory (8 GB).
8. (4) Flags.

- **Equipment:**

1. Digital camera (Sony) (one).
2. Data show projector (one) Lenovo laptop.
3. Electronic stopwatch (four) - Medical scale (one).
4. Medicine ball (two) weighing (2) kg.

"Sensory Perception, Motor Coordination, and Handball Shooting Accuracy Tests: A set of skill tests for handball shooting, sensory perception, and motor coordination were selected. These tests are validated and used by many researchers in this field. These tests are:"

- **First: Sensory Perception Tests.**[3]

A. Ball Throwing Perception Test.
B. Time Perception Test.
C. Horizontal Distance Perception Test.
D. Vertical Distance Perception Test.

- **Second: Motor Coordination Tests.**[4]

A. Tennis Ball Throwing and Reception Test.
B. Numbered Circles Test.

- **Third: Handball Shooting Accuracy Tests.**[5]

A. Test of aiming from a fixed position."

EXPLORATORY EXPERIMENT

On December 4, 2024, the researcher carried out a preliminary exploratory experiment involving a group of four players who were not part of the main research sample. This procedure was executed with the support of an assisting team and aimed to fulfill several essential objectives, namely:

1. Verifying the precision and reliability of data recording procedures.
2. Identifying potential challenges or obstacles within the testing process and exploring methods to overcome them.
3. Assessing the appropriateness and functionality of the equipment and tools utilized in the implementation of the tests.
4. Estimating the duration required to complete each test accurately and efficiently.
5. Ensuring that all members of the support team possessed a clear understanding of the nature of the tests and the correct methods for their administration.
1. Laying the groundwork for the scientific validity and standardization of the tests used in the main study.[5]

SCIENTIFIC FOUNDATIONS FOR TESTS

- Although the physical, motor, and skill-based assessments utilized in this study were standardized, the researcher adhered to a scientific methodology to ensure their appropriateness by verifying both their validity and reliability.
- **Logical Validity:** Validity is considered one of the fundamental criteria for evaluating the quality of any test. It refers to the extent to which a test accurately measures the specific trait, construct, or phenomenon it is intended to assess. In this study, the motor and skill assessments related to the variables under investigation were presented to a panel of subject-matter experts. These experts reviewed the tests and confirmed their content validity, affirming that the tests were well-aligned with the study's objectives and capable of accurately measuring the intended skills.[7]
- **Reliability:** Reliability pertains to the consistency and precision with which a test measures the targeted construct. To determine the reliability of the physical and motor assessments used in this research, the tests were administered to a pilot group consisting of six athletes drawn from the research population, excluding individuals from the primary sample. The tests were then re-administered to the same group under identical conditions after a period of seven days. The reliability coefficient was calculated using the correlation between the results of the first and second test administrations. The table below presents the statistical indicators of reliability and validity for the tests employed in this study.[8]

Table (3): presents the scientific coefficients for the tests studied

Variables	Honesty factor		stability coefficient	Objectivity factor
	Suitable	Not suitable		
Perception of Throwing a Ball	5	0	0.94	0.88
Perception of Time	5	0	0.94	0.89
Perception of Horizontal Distance	5	0	0.89	0.88
Perception of Vertical Distance	5	0	0.84	0.92
Eye-Legging Coordination	5	0	0.88	0.89
Eye-Arm Coordination	5	0	0.94	0.93
Shooting from a Standing Position	5	0	0.92	-

FIELD RESEARCH PROCEDURES

1. **Pretests:** Pretests were conducted for the research sample on January 24, 2025, in a closed room, with the assistance of the support team.
2. **Implementation of Training Materials**

- The experimental group used educational materials, and the researcher implemented agility and motor skills exercises.
- The control group used the method used by the team coach. The researcher's role was to supervise and monitor the implementation of the educational unit components in the field, without intervening.
- The training program lasted (8) weeks, with three teaching units per week, for a total of (24) teaching units.

1. **Each teaching unit lasted (60) minutes.**

POST-TESTS

Post testing was conducted for the experimental and control groups under the same conditions as the pretests for these two skills. Post testing was conducted on February 2, 2025.

RESULTS

Presentation and Analysis of the Results of the Sensorimotor Perception, Motor Coordination, and Handball Shooting Accuracy Tests for the Control and Experimental Groups

Presentation and analysis of the results of the sensorimotor perception, motor coordination, and handball shooting accuracy tests for the control and experimental research groups

Table (4): "shows the means, standard deviations, and calculated t-value between pre- and post-tests in the sensorimotor perception and motor coordination tests for the study group constituting the control group"

		Variables	Pre-tests	Post-tests	(t) value	Type of indication
	Mean	Std	Mean	Std		
Perception of ball throw/number	4.04	1.89	6.82	1.28	3.11	Sig.
Perception of time/second	0.75	0.13	0.51	0.89	2.94	Sig.
Perception of horizontal distance/degree	7.25	2.41	5.82	1.22	3.42	Sig.
Perception of vertical distance/degree	8.86	1.34	5.98	0.80	2.86	Sig.
Eye-arm coordination/number	3.88	1.12	8,33	1.17	3.28	Sig.

Eye-leg coordination/second	4.04	1.89	6.32	0.89	2.92	Sig.

"The results presented in Table (4) demonstrate that the calculated *t*-values for the comparison between the pre-test and post-test scores in both the sensorimotor perception and motor coordination assessments for the control group exceed the critical *t*-value of 2.45 at the 0.05 significance level and 7 degrees of freedom. This statistically significant difference indicates that the control group exhibited measurable improvements in both domains, with post-test scores surpassing pre-test performance."

Table (5): "shows the means, standard deviations and calculated value (t) between pre- and post-tests in the handball shooting form tests for the control group"

Variables	**Pre-tests**		**Post-tests**		**(t) value**	**Type of indication**
	Mean	**Std**	**Mean**	**Std**		
Shooting from a standstill	2,63	1.24	5,44	1.12	3.21	Sig.

"The results of table (5) showed that the calculated t-values between the pre- and post-tests in the handball shooting forms tests for the control group are higher than their tabular value (2.45) at the significance level (0.05) and degree of freedom (7), which indicates the occurrence of significant differences between the pre- and post-tests in favor of the post-test."

Presentation and analysis of the results of the sensorimotor perception, motor coordination, and accuracy of handball shooting tests for the experimental research group.

Table (6): "shows the means, standard deviations, and calculated t-value between pre- and post-tests in the sensorimotor perception and motor coordination tests for the experimental study group"

Variables	**Variables**		**Variables**		**(t) value**	**Type of indication**
	Mean	**Std**	**Mean**	**Std**		
Perception of ball throw/number	3.88	1.86	6,34	1.15	3.78	Sig.
Perception of time/second	0.68	0.13	0.48	0.12	5.29	Sig.
Perception of horizontal distance/degree	8.08	1.28	3.78	0.95	6.12	Sig.
Perception of vertical distance/degree	8.22	1.44	2.21	0.76	4.76	Sig.
Eye-arm coordination/number	3.58	1.21	9.78	1.25	4.08	Sig.
Eye-leg coordination/second	3.88	1.86	5.43	0.34	4.54	Sig.

"The results from Table (6) showed that the calculated values (t) between the pre- and post-tests in the sensorimotor perception and motor coordination tests for the experimental group were greater than their tabulated value (2.45) at the significance level (0.05) and degree of freedom (7). This indicates the existence of significant differences between the pre- and post-tests in favor of the post-test."

Table (7): "shows the means, standard deviations and calculated value (t) between pre- and post-tests in the handball shooting form tests for the experimental research group"

Variables	**Pre-tests**		**Post-tests**		**(t) value**	**Type of indication**
	Mean	**Std**	**Mean**	**Std**		
Shooting from a standstill	3.59	1.27	8,32	1.14	5.44	Sig.

"The results of table (7) showed that the calculated values (t) between the pre- and post-tests in the tests of handball shooting forms for the experimental research group are greater than their tabular value (2.45) at the significance level

(0.05) and degree of freedom (7), which indicates the occurrence of significant differences between the pre- and post-tests in favor of the post-test."

Presentation and analysis of the results of the sensorimotor perception, motor coordination, and accuracy of the dimensional handball shooting shapes tests between the control and experimental research groups.

Table (8): "shows the means, standard deviations and calculated value (t) in the sensorimotor perception and motor coordination tests between the control and experimental groups"

Variables	Control		Experimental		(t) value	Type of indication
	Mean	Std	Mean	Std		
Perception of ball throw/number	6.82	1.28	6,34	1.15	3.11	Sig.
Perception of time/second	0.51	0.89	0.48	0.12	3.71	Sig.
Perception of horizontal distance/degree	5.82	1.22	3.78	0.95	2.72	Sig.
Perception of vertical distance/degree	5.98	0.80	2.21	0.76	3.49	Sig.
Eye-arm coordination/number	8,33	1.17	9.78	1.25	4.65	Sig.
Eye-leg coordination/second	6.32	0.89	5.43	0.34	4.04	Sig.

"The results in Table (8) showed that the calculated values (t) between the control and experimental groups in the post-tests of sensorimotor perception and motor coordination were greater than their tabulated value (2.45) at the significance level (0.05) and degree of freedom (14). This indicates the existence of significant differences between the pre- and post-tests in favor of the post-tests."

Table (9): "shows the means, standard deviations and calculated values (t) of the accuracy of handball shot shapes after the test between the control and experimental groups"

Variables	Control		Experimental		(t) value	Type of indication
	Mean	Std	Mean	Std		
Shooting from a standstill	5,44	1.12	8,32	1.14	3.06	Sig.

"The results of Table (9) showed that the calculated t-values between the control and experimental groups in the tests of the accuracy of post-handball shooting shapes were greater than their tabular value of (2.45) at a significance level of (0.05) (and under a degree of freedom of (14). This indicates the presence of significant differences between the pre- and post-tests in favor of the post-test".

DISCUSSION OF THE RESULTS

"From the results presented in Tables (4, 5, 6, and 7) for the sensory perception, "motor coordination, and handball shooting accuracy tests for the control and experimental groups, which showed significant differences in favor of the post-tests for both groups, the researcher attributes the reason for these differences for the control group to the influence of the approach followed by the club's head coach, in addition to the players' commitment and regularity in training, their continued performance of the skill, and their repetition of it, which played a clear role in their development in the studied variables. Sources indicate that "the many repetitions a player practices during practical training help them acquire and develop performance."[9]Moreover, handball shooting is an important offensive skill, as hitting the target is the ultimate outcome of performance and the decisive factor in determining the outcome of a match. This prompted members of the control group to commit to the entire lesson time to achieve accurate scoring. As for the experimental group, whose teaching methods were introduced, the researcher attributes the significant differences that occurred between the pre- and post-tests to the availability of sufficient space for teaching and improving sensory perception."[10]

"Motor coordination and shooting accuracy are developed through the use of training and educational tools in educational units that are compatible with the players' capabilities in developing their awareness of distance," time, or place within the field, in addition to developing motor coordination among members of this group, which has a clear impact on developing technical performance and its accuracy, because "the beauty of performance and its development depend on the development of cognitive processes as a result of the players undergoing exercises using training tools that help develop

these abilities, which leads to the development of their sense of the ball due to the strength of the nervous processes, which results in an increase in their awareness of the external environment."[11] The results of Tables (8, 9) also indicated significant differences in the post-tests between the control and experimental groups, demonstrating the superiority of the experimental group. The researcher attributes this to the impact of the educational and training methods introduced into the training modules, which contributed to the development of sensory perception, which in turn led to the player's success in their skill performance. Sensory-motor perception leads the athlete to success in their movements, provides the ability to discover new tactics, and enables motor coordination.[12] Furthermore, sensory perception has a direct impact on the development of skill performance, its accuracy, and the acquisition of new skills. Furthermore, playing situations, especially when shooting, require the senses of touch and sight, as well as some internal sensations, such as the sense of direction, distance, and time, more than any other sense. This provides players with broad horizons in understanding a wider range of variables surrounding performance. The results also clearly demonstrated the superiority of the experimental group in motor coordination tests. This is what educational methods have worked on, developing motor coordination, which is linked to many other physical and motor abilities, such as speed, agility, balance, and accuracy. [13]"The connection between coordination and speed is evident in the temporal requirements of motor performance, while agility, balance, and accuracy are evident in the formal and spatial requirements of movement, i.e., moving the body and its parts with the required precision throughout space."[14] In the results of handball shooting accuracy, we find that the experimental group also excelled. The researcher attributes the reason for this to the fact that shooting is one of the motor skills that require great precision in training, and that its performance requires high coordination from the mental and motor point of view, as well as neuromuscular compatibility and extreme precision, which clearly demonstrated the role of educational means in the accuracy of the performance of the players in this group, because accuracy is considered “an important requirement upon which victory depends, as it is the desired goal in performance to score points. If the final result of fast, strong performance is measured, we find that it is useless if it lacks precision.”[15] This is what the researcher went to in order to achieve his hypotheses."

CONCLUSIONS

1. The use of educational and training methods in the units had an effective impact on the development of sensory perception, motor coordination, and handball throwing accuracy in the experimental group.
2. The curriculum developed by the team coach played a significant role in the development of sensory perception, motor coordination, and handball throwing accuracy in the control group.
3. The experimental group achieved a significant advantage over the control group in tests of sensory perception, motor coordination, and handball throwing accuracy.

RECOMMENDATIONS

1. The need to emphasize the importance of incorporating educational and training methods into the Maysan Club curriculum, aimed at developing mental processes and motor coordination in youth handball.
2. The need to focus on specific sensory perception training during sports training, identifying sensory perception variables specific to handball, and working on ways to develop them.
3. Conducting research and analyses across various age groups, across all game categories, and among both genders in handball and other sports (team and individual).

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