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The effect of training using educational tools on improving the turning skill in 100-meter freestyle swimming for juniors aged 13-15 years

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Abstract

The research aims to: prepare exercises using educational tools to improve the rotation skill for 100-meter freestyle swimming for juniors aged (13-15 years), and to identify the effect of exercises using educational tools in improving the rotation skill for 100-meter freestyle swimming for juniors aged (13-15 years). The researchers adopted the experimental method with two experimental and control groups to suit the nature of the research. The research community was determined by the swimmers of Al-Salam Sports Club for the season (2023-2024 AD), numbering (12) swimmers, and the research sample consisted of the research community itself, i.e. (100%) of the original community. The researchers divided the sample into: (2) swimmers for the exploratory experiment and (10) swimmers for the main experiment sample. The researchers also sought to homogeneity of the research sample in the research variables that may constitute extremism in the test results. The tests used in the research were determined as follows: the rotation test in freestyle swimming, and the effectiveness test of (100 m) freestyle swimming. The researchers conducted a mini-experiment similar to the real experiment on a sample of (2) swimmers selected from the swimmers of Al-Salam Club who practice freestyle swimming on (04/15/2024). Various observations about the tests and instructions were recorded, and obstacles, difficulties and errors that could occur during the implementation of the main experiment were identified in order to avoid them, knowing the appropriate timing hours for each timekeeper and the places where the referees and timers stand, knowing the time period required to implement the tests. The pre-tests were conducted for the research sample members by the assistant work team, and the researchers established the conditions for the tests and the method of conducting them in order to achieve the same conditions as much as possible when conducting the post-tests. Therefore, the pre-tests were conducted at exactly eleven o'clock in the morning on (04/20/2024), as a (15 m) freestyle swimming test and a (100 m) freestyle effectiveness test were conducted. The main experiment was then conducted with (24) units, at a rate of (3) training units per week, training duration (10) weeks, and the intensity used ranged between (75%-95%) and in an ascending method of 3:1. The researchers concluded that the results showed that the use of innovative educational methods contributes significantly to improving the rotation skill of young swimmers. Exercises using educational methods contributed to reducing the total time taken to complete the 100-meter freestyle race. The study showed that directed exercises targeting technical skills such as rotation lead to a noticeable improvement in athletic performance. The exercises also helped improve basic swimming skills, which qualifies swimmers for higher-level competitions.

Keywords: Teaching aids, rotation skill, 100 m freestyle, junior swimmers

Introduction

Motor learning is one of the most important processes that contribute to the development of physical and skill capabilities in individuals, as it represents the foundation upon which motor skills are built in their various forms. Motor learning is defined as the process through which new motor skills are acquired, or existing skills are improved and developed, through the interaction between the central nervous system and the muscular system in the context of a directed educational or training environment.

For young people, motor learning is of utmost importance, as this age represents a golden period for developing physical and motor skills, given the flexibility of their bodies and their quick response to learning.

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During this period, young people can acquire precise movement patterns that will continue with them throughout their athletic careers, establishing a solid foundation for improving performance in various physical and sports activities^[13, 11].

Motor learning is not limited to improving physical performance only, but extends to developing other abilities such as concentration, balance, reaction, and accuracy. It also contributes to enhancing the self-confidence of young people and encouraging them to achieve their athletic goals. Building motor skills at this stage contributes to preparing athletes for future competitions, and gives them a competitive advantage in various sports^[9, 7].

Therefore, designing training programs based on the principles of motor learning, along with providing a stimulating learning environment, is considered one of the fundamental pillars in preparing young people to reach advanced athletic levels. Sports physiology in swimming focuses on how exercises and sports practices affect the body during swimming. This science addresses several aspects such as cardiovascular performance, as swimming contributes to improving heart efficiency and increasing endurance. It also studies how to use muscles effectively, as swimming requires high coordination between different muscles. In addition, swimming contributes to improving the body's ability to deal with oxygen, which increases endurance and speed. Another important aspect is the effect of swimming on the respiratory system, as it enhances the lungs' ability to absorb air and distribute oxygen more effectively. Sports physiology also includes understanding how factors such as water temperature and nutrition affect performance. By studying these factors, coaches and swimmers can develop customized training programs that help improve performance and reduce the risk of injuries. Therefore, sports physiology plays a fundamental role in enhancing swimming effectiveness and developing swimmers' skills^[12, 10].

Swimming is one of the most prominent water sports that requires a high balance between physical and skill performance, as it relies on speed, strength, and technical skills to achieve optimal performance. Among these skills, the skill of rotation stands out as a crucial element in improving performance and saving time during the race, especially in short-distance swimming such as the 100-meter freestyle.

With the continuous development of sports sciences, interactive educational methods have become one of the most important tools used in developing the skill capabilities of athletes, as they provide a stimulating educational environment based on practical application and immediate feedback. These methods help make learning more effective and faster, which is positively reflected in athletic performance^[11].

Juniors are considered the group that benefits most from these methods, as they are characterized by flexibility in learning and quick response to new technologies. Hence, the idea of the current research came to shed light on the effect of exercises using interactive educational means in improving the rotation skill for 100-meter freestyle swimming for juniors.

This research seeks to provide a training program based on

innovative educational methods, with the aim of improving the technical and skill performance of the rotation skill, and contributing to achieving the best results for this age group, in line with modern developments in the field of swimming training.

The skill of rotation in swimming is one of the basic elements that directly affect achieving optimal performance in short-distance races, such as the 100-meter freestyle race. Many juniors in the age group (13-15 years) face difficulties in mastering this skill, which leads to losing time during the race and weakening their overall efficiency. Despite the great development in modern training methods, traditional programs often lack the use of interactive educational tools that help enhance learning and improve skill performance. This deficiency limits the ability of coaches to develop the technical aspects of juniors in a manner that suits their physical and age needs. Hence, the research problem arises, in the literature on the following question: What is the effect of exercises using interactive educational tools on improving the skill of rotation in 100-meter freestyle swimming among juniors aged (13-15 years)? Therefore, the research seeks to address this problem by providing innovative training solutions based on the use of educational methods to improve the technical performance of juniors, which contributes to raising their competitive level in swimming.

The aim of the research was to prepare exercises using educational means to improve the rotation skill for swimming 100 meters freestyle for juniors aged (13-15 years), and to identify the effect of exercises using educational means in improving the rotation skill for swimming 100 meters freestyle for juniors aged (13-15 years).

The study assumed that there are statistically significant differences in the exercises of educational means in improving the rotation skill of 100-meter freestyle swimming for juniors.

Materials and Methods

The researchers adopted the experimental approach with two groups, experimental and control, to suit the nature of the research.

The available research community is defined as “the available number of the targeted research community, which the researcher can refer to in order to draw a sample from it^[10, 9]. The research community was determined by the swimmers of Al-Salam Sports Club for the season (2023-2024), numbering (12) swimmers. The research sample consisted of the research community itself, i.e. at a rate of (100%) of the original community. The researchers divided the sample into: (2) swimmers for the exploratory experiment and (10) swimmers for the main experiment sample.

In order to verify the homogeneity of the sample before starting the work, which could affect the accuracy of the results later on, the researchers extracted the skewness coefficient for the entire research sample before distributing them into research groups (Before identifying or naming each group). The results proved that the sample was homogeneous in terms of variables, and Table (1) shows this.

Table 1: Shows the homogeneity of the research sample

Skewness	S.T	Mean	Elements	↔
-0.107	5.599	161.916	Length (cm)	1
-0.273	4.313	56.333	Weight (kg)	2
0.262	.7170	13.833	Age (Years)	3
1.147	1.435	7.666	Training age (month)	4

The researchers used the following devices, tools and means of collecting information: a swimming pool of (50) m in length, a measuring tape, a scientific hand calculator of the (Sony) type, a hand stopwatch of the (Smartime) type, a FOX whistle of (2), an electronic calculator of the (HP Pavilion G6) type, (1) of (5) m of German-made double-resistance elastic ropes, a ring specially designed for the purpose of performing the skill of rotation in the water, a swimming board made of high-quality foam of (5), Arab and foreign sources, the international information network (the Internet), observation and experimentation.

Tests used in the research

Freestyle Spin Test ^[3, 7]

In order to determine the pre- and post-level of performance of the freestyle swimming rotation skill for the research sample members, they were tested with the mentioned skill as follows: The test begins with freestyle swimming from a distance of 15m from the end of the pool and then performs the rotation and returns to the same point, as the expert evaluates the form of the rotation motor performance (Approaching - curling - pushing and flowing - motor coordination of body parts during performance) by giving a score out of 10 to represent the level of learning the rotation motor performance, noting that the values of the two teachers' scores given to each learner were collected and divided by (3) to extract the arithmetic mean of the final value of each learner's score to be dealt with statistically later. The performance evaluation was also individually and independently for each expert.

100m Freestyle Swimming Efficiency Test ^[4]

Objective of the test: To measure the time of (100 m) freestyle swimming.

Equipment used: Olympic Peace Pool (50 m), stopwatches, whistle, registration forms.

Description of the test performance: The swimmer stands at the standing platform in the designated area and upon hearing the word (Take) from the shooter, he takes the starting position and after hearing the shooter's whistle, he jumps from the platform into the water and covers a distance of (100 m) in the freestyle swimming method at maximum speed.

Recording: After completing the race distance, the average time achieved by the swimmer is recorded

Exploratory experiment

The pilot experiment is a practical training for the researchers to identify the negatives and positives during the test and to avoid the negatives ^[8, 7]. The researchers conducted a mini-experiment similar to the real experiment on a sample of (2) swimmers selected from the swimmers of Al-Salam Club who practice free swimming on (April, 15, 2024). Various observations were recorded about the tests and instructions, and the obstacles, difficulties and errors that could occur during the implementation of the main experiment were identified in order to avoid them, to know the work of the appropriate timing clocks for each timekeeper and the places where the referees and timers stand, and to know the time period required to implement the tests.

Pre-tests

The pre-tests were conducted for the research sample individuals by the assistant work team. The researchers fixed the conditions for the tests and the method of conducting them in order to achieve the same conditions as much as possible when conducting the post-tests. Therefore, the pre-tests were conducted at exactly 11:00 am on (04/20/2024), where a (15 m) freestyle swimming test and a (100 m) freestyle event test were conducted.

Table 2: Shows the equivalence of the two samples in the tests under study

Result	Sig	Test value	Experimental group		Control group		Elements
			s.t	Mean	s.t	Mean	
Negative	0.545	0.632	0.547	2.400	0.447	2.200	Rotation Test
Negative	0.694	0.408	0.836	65.800	0.707	66.000	Achievement Test

Main experiment

The foundations on which the researchers relied in applying their educational approach were as follows: The experimental group was given special exercises using the educational tools used in the research (inside and outside the water) to improve the skill of rotation. As for the control group, their training was according to a training curriculum prepared by their personal trainer.

Thus, the details of the exercises are as follows:

- Number of units (24) units, at a rate of (3) training units per week.
- Training duration (10) weeks.

- The intensities used ranged between (75%-95%) and in an ascending method of 3:1
- Regarding the educational methods used, they are as follows:

Bungee band

Sports tool used in strength and flexibility exercises. It is characterized by being lightweight and adjustable, which allows for the provision of different resistance levels that are used in a different way to suit the skill procedures used. It consists of several parts: a resistance band (3 meters long) consisting of a thick climbing clip that does not rust and is in the water and a latex tube (15.24 cm thick) that is flexible

and will not stick or break easily. It can be extended to three times its original length and is covered with a durable anti-tension fabric. The back belt is made of high-strength polypropylene threads. Its size can be controlled according to the size of the swimmer. In the middle of the back there is a loading clip with a D-ring. Maximum load capacity is 1500 pounds. It contains a 15.24 cm wide foam protection layer with a thick and dense fixing clip for the purpose of bearing a higher load.

The ring

The principle of operation of the device depends on the swimmer passing through this ring without touching its internal and external surroundings. This method can be used for several purposes in the skill of rotation in freestyle swimming. One of the common mistakes in performing this skill is when the rotation is performed and the legs are raised against the wall, the contact with the wall is in a downward, unstable manner. In order to accelerate the path of the body, the ring is used to determine the path for the swimmer to slip and slide. Another use is to correct a common mistake. When rotating, the swimmer's body is unbalanced. The arms and legs are not joined together. The ring is used and the crossing is done with repetitions to improve it. Another benefit is determining the location of

the ring and placing it close to the wall until the swimmer takes his last breath before performing the rotation so that the head is stable and looking down.

Swimming Noodles

Flexible stick made of high quality polyethylene foam makes water activities easy to move and helps to float (thickness 6.5 length 150cm)

Post-tests

After completing the main experiment, the post-tests were conducted for the research sample on (July, 18, 2024) to determine the extent of the impact of the exercises with the educational tools. All the variables established in the registration form were measured in the same way in which the pre-tests were conducted. The researchers took into account all the temporal and spatial conditions that were used when conducting the pre-tests.

Results

To verify the effect of exercises using educational means in improving the rotation skill for swimming 100 meters freestyle among juniors aged (13-15 years), the researchers present the results they reached in the table below:

Table 3: Shows test results

Results of the tests under investigation (Pre- and post-test) for the control group							
Result	Sig	Test value	Post Test		Previous test		Elements
			s.t	Mean	s.t	Mean	
	0.004	6.000	0.547	3.400	0.447	2.200	Rotation Test
	0.003	6.325	1.000	64.000	0.707	66.000	Achievement Test
Results of the tests under investigation (Pre- and post-test) for the experimental group							
Result	Sig	Test value	Post Test		Previous test		Elements
			s.t	Mean	s.t	Mean	
	0.000	11.000	0.547	4.600	0.547	2.400	Rotation Test
	0.007	5.013	1.140	62.400	0.836	65.800	Achievement Test
Results of the tests under investigation (Post-test) for the control and experimental groups							
Result	Sig	Test value	Experimental group		Control group		Elements
			s.t	Mean	s.t	Mean	
	0.009	3.464	0.547	4.600	0.547	3.400	Rotation Test
	0.047	2.359	1.140	62.400	1.000	64.000	Achievement Test

Discussion

The above tables show that the differences are significant between the pre-test and post-test and in favor of the post-test in the rotation test and the achievement test for the control group. The researchers attribute the reason to the fact that the swimmers' exercises for the control group included many activities and competitions between the swimmers, which made them more attracted to learning, which increased their love and passion for learning ^[4, 6]. Indicates that "organized practice of sports activities positively affects the technical level of the players. Given that the training included educational tools specific to the swimming coach, it increased the swimmers' desire for movement and made them distinguished by constant movement. This was confirmed by ^[1] that "one of the natural phenomena of the learning process is that there must be development in learning as long as the teacher follows the steps of the sound foundations of learning and teaching. From the researchers' point of view, the many repetitions of the exercises during the educational units played a role in raising the level of their performance.

As it is clear from the tables above, the differences are also significant between the pre- and post-tests of the experimental group and in favor of the post-test in the rotation test and the achievement test, which achieves the first part of the first hypothesis. The researchers attribute these differences to the exercises prepared by the researchers and the use of educational aids, as they helped swimmers acquire direct motor experiences, as it is one of the most important functions of exercises and educational aids, through which their sports skills grow clearly through interest in the learner's technical level. Technical performance plays a major role in providing good levels, as "the good level in many sports is determined by the element of (Technique) and not only by physical fitness ^[2]. The researchers also paid attention to the educational aspect and focused on the educational steps of the skills under study and giving the process of explaining the educational steps and sufficient time. The researchers attribute the emergence of significant differences in favor of the post-test to the presence of educational aids, as they worked on good learning of performance and also facilitated the process of transferring the educational material to the learner and providing him with experience that helps him develop his

motor skills, which helps to Extending the process of remembering the skills that were learned. The researchers attribute the superiority achieved by the experimental group in the post-test to the use of exercises using educational tools for the experimental group, as the researchers agree with what was stated by [7] in “that the main goal of this method is to give the learner an opportunity to participate socially with others and make him more able to choose the level he wants to start at, which is an enjoyable and encouraging process for learning.”

Through the results obtained by the researchers from the tests shown in the tables above, it became clear that there were significant differences between the control and experimental groups in favor of the experimental group. This indicates that the experimental group learned the motor skills under study better than the control group. The researchers attribute this to the effective impact of the exercises prepared using educational tools and following the correct steps in implementing them, most notably the gradual teaching of skills. The gradual implementation of the exercises using educational tools and in a manner consistent with the chronological and cognitive age of the research sample helped in developing the level of performance. The commitment of the research sample (the experimental group) to the educational units and the implementation of their components regularly and continuously gave the swimmers a sufficient amount of repetitions, as "learning the skill is not achieved by the presence of motivation alone or by watching a model or by explaining and presenting the skill from the trainer unless it is learned and trained continuously. Training and practice are necessary for learning and the individual's interaction with the skill increases and he can control it and can organize and coordinate movements through the training process, so it is an important and necessary factor for learning by following the correct and simple educational steps" [6]. Also, "one of the natural phenomena of the learning process is that there must be development in learning as long as the trainer follows the steps of the sound foundations of learning and teaching. In order for the beginning of learning to be sound, the explanation, presentation, and training on the correct performance must be clarified and focused on until the motor performance is consolidated and stable" [1].

Conclusion

1. The results showed that the use of innovative educational methods contributes significantly to improving the rotation skill of young swimmers.
2. The exercises using educational methods contributed to reducing the total time taken to complete the 100-meter freestyle race.
3. The study showed that targeted exercises targeting technical skills such as rotation lead to a significant improvement in athletic performance.
4. The target sample aged (13-15 years) had a positive response to the training program, indicating the importance of this age period for skill development.
5. The exercises helped improve basic swimming skills, which qualifies swimmers for higher-level competitions.

Recommendations

Using the educational aids used in the research to teach beginners the skill of rotation in freestyle swimming.

1. Using the educational aids used in the research to teach and develop other types of sports.

2. Using the first educational aid with rubber ropes to teach the skill of floating and other freestyle swimming skills.
3. The educational aids used in the research can be applied to similar age groups to achieve similar positive results.
4. Integrating educational aids as an essential part of training programs for swimmers to improve technical skills and reduce errors during performance.

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