The Effect of Multi-Level Adaptive Training on Some Special Physical Traits and the Achievement of the 100-Meter Freestyle

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ABSTRACT

This research came to identify the effectiveness of multi-level adaptive training as one of the modern methods in developing special physical characteristics and improving the achievement of the 100-meter race. This type of training is based on the principle of gradation in intensity, size and adaptation to the player's individual abilities, so that the training modules are distributed in a way that allows the load to gradually increase according to multiple levels, taking into account the physical response of each player, the researcher relied on the experimental method by applying a training program to a sample of swimmers, and for a specific period of time ranging between (4-6) weeks. The training program included various units that targeted the physical characteristics of the 100-meter race, the results showed that there were significant differences in favor of the group that was trained according to the multi-level adaptive training method, where a remarkable development was achieved in:

– Improve special physical qualities associated with speed and strength.

– Reduce the completion time of the 100m race better compared to the control group.

The researcher concluded: Multi-level adaptive training is an effective method for developing the physical characteristics of short-distance athletes, and it is recommended to adopt the multi-level adaptive training method within the training programs of juniors and youth.

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1- <u>Introduction to the research</u>
<u>1-1 Introduction and Importance of the Research:</u>

Athletic training methods have evolved significantly in recent decades, with the focus not only on the severity and frequency of pregnancy, but also on how an individual responds to and adapts to pregnancy. Multi-level adaptive training is a modern trend that aims to take into account individual differences among trainees, by designing graded training loads that allow optimal adaptation, which helps to improve the level of athletic performance.

Swimming is a sport that requires a clear integration between muscular strength, endurance, and speed, as the achievement of the 100-meter freestyle depends on the swimmer's ability to harmonize these physical qualities. However, traditional methods of training often ignore individual differences, resulting in varying levels of achievement.

The importance of the current research lies in the fact that it links a modern training trend (multi-level adaptive training) with the development of special physical traits related to performance in the 100-meter freestyle, which adds a new scientific and applied dimension to the field of athletic training. In practice, the research provides a training model that coaches can use in preparing swimmers, through flexible physical adaptation strategies that suit their individual abilities.

<u>1-2 Research Problem:</u>

Despite the great importance of the 100m freestyle as one of the most prominent competitive swimming events, the training reality indicates that there is a lack of achievement for some swimmers, often due to the adoption of traditional training methods that do not take into account individual levels of adaptation to training loads. Focusing on one aspect of physical characteristics and neglecting the other aspects leads to an imbalance in the overall performance of swimming. Hence, the problem of the research emerges in the following question:

Does multi-level adaptive training contribute to the development of certain physical qualities and improve the achievement of the 100-meter freestyle in students?

1-3   Research Objectives:

1.3.1 Develop a multi-level adaptive training programme targeting certain physical characteristics associated with the 100 m freestyle.

1-3-2 Identify the impact of the program on the development of these special physical traits in students.

1-3-3 Identify the impact of adaptive training on improving the achievement of the 100-meter freestyle.

<u>1-4 Research Hypotheses:</u>

The researcher assumes the following:

1-4-1 Multi-level adaptive training has a positive effect on the development of certain physical traits in students.

1-4-2 Multi-level adaptive training has a positive effect on improving the achievement of the 100-meter freestyle.

1-5 Research Areas:

1.5.1 Human Field: Nineveh Governorate Swimmers / University of Mosul

1-5-2 Time Range: For the period from 8/3/2025 to 2/5/2025.

1-5-3   Spatial Domain: Indoor College Pool.

2- Theoretical and similar studies

3- Search Procedures

3-1 Research Methodology:

Choosing the appropriate approach for the nature of the research problem and its objectives is one of the basic requirements in scientific research. Research methodology is defined as "the overlapping intellectual organization in scientific study or the intellectual steps followed by the researcher to solve a particular problem." (Nouri: 2004, 51), where the researcher adopted the experimental method to suit the nature of the research, using the design of the two groups (control and experimental) with parity in all influencing factors except for the independent variable (multi-level adaptive training program).

3-2 Research and Sample Population:

The research population consisted of (12) swimmers from Nineveh Governorate. They were fully selected to represent the main research sample, where they were divided (by lottery) into (5) swimmers in the control group and (5) swimmers in the experimental group. The researcher also used (2) swimming students from the same community to conduct the survey studies.

3.3 Homogeneity:

The researcher verified the homogeneity of the research sample members in the variables (height, weight, age) using the torsion coefficient, and the results were within the normal limits, which indicates the homogeneity of the sample

Conclusion	Torsion coefficient	Standard deviation	Broker	Arithmetic mean	Unit of Measurement	Variables
homogeneous	0.268	3.931	175	174.65	Poison	Length
homogeneous	0.589	3.194	70	70.65	kg	Body mass
homogeneous	0.466	1.147	20	20.6	Year	Chronological age

3-4   Data Collection Methods:

3-4-1   Arab and foreign sources and references.

3-4-2   Personal interviews.

3-4-3   Physical and skill tests and measurements.

3-4-4   Special forms for recording test results.

3-5   Methods, tools and devices used in research:

3-5-1 Electronic stopwatch.

3-5-2 Height and weight measuring tools.

3-5-3 Whistle

3-5-4 Plastic Signs

3-5-5 Electronic calculator (laptop).

3-5-6 Scoring Forms

3-5-7 Model Olympic swimming pool

3-6 Field Procedures for Research:

Description of the Tests

1- Muscle Strength Test of the Legs (Vertical Jump) (Bastoisi Ahmed, 2002)

- The objective of the test: to measure the explosive force of the muscles of the legs, which is one of the most important physical qualities associated with jumping and pushing in swimming.
- Tools used: Centimeter inserted wall, chalk powder to distinguish the touch of the hand.

Performance Method:

- The student stands next to the wall, and sets the level of the highest point that the hand can reach when standing normally.
- The student bends his knees and then jumps vertically as high as he can, touching the wall with his fingertips.
- The difference between the top point during the jump and the point scored while standing.
- Scoring: Best of three attempts (in centimeters).

2- Special Endurance Test (200 Meters Freestyle Swim at Full Speed) Mujahid Mahmoud, Abdulaziz Al-Nimr (2005)

- The objective of the test: to measure the swimmers' special endurance, which is essential in the 100-meter freestyle.
- Tools used: Legal swimming pool (25 or 50 meters), electronic stopwatch, registration form.
- Performance Method:
1. The student stands on the starting platform, then begins the 200-meter freestyle at the top speed possible.
2. Only one attempt is allowed to ensure the accuracy of the results.
- Recording: Records the time taken in seconds from the moment of departure to the end of the distance.

3- Performance Speed Test (25 Meters Freestyle Swim from High Start) Al-Tabbak, Abdulrahman (2011)

- The objective of the test: to measure the maximum performance speed of the swimmers, which is one of the most important key determinants in the 100-meter freestyle.
- Tools used: Legal pool, stopwatch, start whistle.
- Performance Method:
1. The student stands on the starting platform.

2. At the start signal, swim for 25 meters freestyle at full speed.
3. The time is stopped when the student touches the final wall.
- Scoring: Time is recorded in seconds, and the best score is calculated from two attempts.

4- Achievement Test (100 Meters Freestyle Swim from High Start) Mujahid Mahmoud, Ahmed Fathi Al-Zayyat (2010)

- The objective of the test: to measure the student's actual level of achievement in the 100-meter freestyle, which is the main test to measure the dependent research variable.
- Tools used: Legal swimming pool (25m or 50m), accurate electronic stopwatch, start whistle, results registration forms.
- Performance Method:
1. The student stands on the starting platform.
2. At the referee's signal (whistle), the full 100 meters freestyle swim begins, at the top speed possible.
3. The student must adhere to all approved free swimming laws (FINA).
- Recording: Records the time taken in seconds from the moment of launch to the final wall. Supports the best performance from just one attempt to ensure maximum effort

3-7 **Exploratory Experiment:**

An exploratory experiment is defined as a preliminary study that is carried out on a small sample before the main experiment, to verify the suitability of tools and procedures and ensure their effectiveness (Arabic Language Academy, 1994, p. 72).

The researcher conducted the first exploratory experiment on (Sunday) (9/3/2025), on a reconnaissance sample consisting of (2) swimmers from outside the main research sample. This experiment aimed to:

- Ensure that the instructions for the special physical and skill tests are clear.
- Testing the validity of tools and devices (stopwatch, pool, registration forms).
- Determine the right time to take the tests.

3.8 Tribal Measurements

The researcher conducted the pre-measurements on (Monday) (10/3/2025) at (9) am in the closed pool inside the Faculty of Physical Education and Sport Sciences, on the two research groups (experimental and control) according to the conditions and instructions for each test (strength, endurance, speed, and the completion of the 100-meter freestyle).

3.9 Main experience

The researcher prepared and organized the training program using multi-level adaptive training, relying on personal experience and modern scientific sources. The program started on (11/3/2025) and continued until (25/4/2025).

Training Mechanism: The principle of adaptive training is based on dividing the load into multiple levels (light, medium, high), so that the swimmer moves from one level to another according to his individual response to the training.

1. Level I (Initial Adaptation): Includes low loads and moderate intensity focused on special warm-up and basic skills.
2. Level II (Intermediate Adaptation): Gradual load lifting with the introduction of special strength and muscular endurance exercises.
3. Level III (High Adaptation): High loads of a competitive nature to simulate the conditions of a 100-meter freestyle race.

- Number of units: 12 training units, two units per week.
- Components of the unit: general and special warm-up, various adaptive exercises for special physical characteristics, swimming exercises directed at different distances, competitive applications, cooling.
- Concentration: Gradual in the load and adapting to its intensity in proportion to the abilities of each swimmer.

3.10 Dimensional measurements

After the completion of the training modules according to the multi-level adaptive training curriculum, the post-tests were conducted on the two groups (control and experimental) on (Sunday) (27/4/2025) at (9) am, in the same place and under the same conditions as the pre-tests.

3.11 Statistical Methods

The researcher used the statistical program (SPSS)

4. Presentation and discussion of the results

4.1.1 Presentation and discussion of the results of the study in the research variables of the control group:

Table (2)

Shows the results of the control group's skill tests

Significance	SIG Value	T-value	Post-testing		Pre-test			Variables
			±	Going to	±	Going to		
Moral	0.022	2.122	0.994	3.24	1.184	3.14	Poison	Muscle strength test for the legs
Moral	0.018	2.104	1.321	49.5	1.236	51.2	Second	Special Endurance Test
Moral	0.009	3.033	1.204	20.2	1.833	22.5	Second	Performance Speed Test
Moral	0.012	2.228	1.278	64.4	2.013	69.2	Second	Achievement Test

4.1.2 Presentation and discussion of the results of the study in the variables researched for the experimental group:

Table (3)

Shows the results of the experimental group's skill tests

Significance	SIG Value	T-value	Post-testing		Pre-test		Measurement	Variables
			±	Going to	±	Going to		

Significance	SIG Value	T-value	±	Going to	±	Going to		Variables
Moral	0.008	2.241	0.929	3.72	0.966	3.21	Poison	Muscle strength test for the legs
Moral	0.006	3.273	1.045	44.8	1.226	52.4	Second	Special Endurance Test
Moral	0.002	3.206	1.142	17.8	1.056	23.1	Second	Performance Speed Test
Moral	0.002	3.117	1.113	61.2	1.411	68.1	Second	Achievement Test

4.1.3 Presentation and discussion of the results of the post-tests in the variables studied for the control and experimental groups:

Table (4)

Shows the results of the skill tests of the control and experimental group in the post-tests

Significance	SIG Value	T-value	Post-testing **For the experimental group**		Post-testing **For the control group**			Variables
			±	Going to	±	Going to		
Moral	0.004	4.221	0.929	3.72	0.994	3.24	Poison	Muscle strength test for the legs
Moral	0.000	9.342	1.045	44.8	1.321	49.5	Second	Special Endurance Test
Moral	0.012	2.124	1.142	17.8	1.204	20.2	Second	Performance Speed Test
Moral	0.017	2.942	1.113	61.2	1.278	64.4	Second	Achievement Test

4-2 Discussion of the Results :

The results of Table (2) indicate that there are significant differences between the results of the pre- and post-tests in the studied variables (strength - endurance - speed - 100 m achievement), where the results came in favor of the post-tests. The training modules were scheduled in a way that ensures that the players achieve the maximum benefit from performance through exercises that focus to repeat the movements correctly. This approach helps to enable players to master skills and develop their motor perception better. In this context, Sayed Mohamed and Mahmoud Abdel Moneim (1993) point out that the regular repetition of skills leads to their effective learning, according to the theory that a successful response is more frequent and time-latest, which enhances their stability (**Muhammad and Mamdouh: 1993, 23).**

The results of Table (3) of the experimental group who underwent multi-level adaptive training showed a clear improvement in some special physical attributes, in addition to a remarkable development in the completion of the 100-meter distance. This improvement is due to the adaptive nature of training that relies on variation in intensity, size and repetitions, which helps the player to scale in performance and be able to adapt to the demands of the race.

The diversity in training levels also helped to better stimulate the nervous and muscular systems, which was reflected in an improvement in the speed of motor response and an increase in the

ability to produce motor during the race period. These results are consistent with the view of Abdulrahman Zaki (2018) who pointed out that gradual training adaptation contributes to raising the efficiency of working muscles and increasing their effectiveness in fast activities. Gambetta also confirmed(2019) found that the use of multi-level training programs helps young players move past the initial adjustment stage and reach higher levels of achievement faster.

Thus, it can be said that the results achieved by the experimental group prove the effectiveness of multi-level adaptive training in developing special physical traits and achieving better achievement in sprint races such as the 100 meters.

The results of the experimental group also showed a clear superiority over the control group in all the variables studied (strength - endurance - speed - 100 m achievement), due to the adoption of multi-level adaptive training that enabled the swimmers to gradually develop the training load according to their individual abilities, which helped to improve their physiological and physical responses better than the traditional method

5- Conclusions and recommendations

5.1 Conclusions

1. Multi-level adaptive training has proven to be highly effective in improving certain physical qualities (strength, endurance, speed) beyond traditional training.
2. The implementation of the adaptive program was directly reflected in raising the level of achievement of the 100-meter freestyle swimming among the members of the experimental group.
3. The adaptive approach contributed to taking into account the individual differences between the swimmers, which enhanced the maximum utilization of the training program.

5.2 Recommendations

1. Adopting multi-level adaptive training as an approved training method in colleges and clubs because of its effective impact on achievement.
2. Consider individual differences when designing training programs for swimmers to achieve the best possible results.
3. Direct future research to apply adaptive training to different swimming distances and ages to test its responsiveness.

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