



## *A Methodological Alternative to Optimize the Athletics Race Start Technique in Swimmers*

[Alternativa metodológica para el perfeccionamiento de la técnica de salida de atletismo en nadadores]

[Alternativa metodológica para o aperfeiçoamento da técnica de iniciação ao atletismo em nadadores]

Danniuovys Martínez Pedro<sup>1\*</sup>  , José Ignacio Ruiz Sánchez<sup>2</sup> 

<sup>1</sup>Cerro Pelado Provincial Sports School (EIDE), Camagüey, Cuba.

<sup>2</sup>Manuel Fajardo Faculty of Physical Culture, the Ignacio Agramonte Loynaz University, Camagüey, Cuba.

\*Correspondence: danniuovys@gmail.com

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### **ABSTRACT**

A study was done in order to design a methodological alternative to optimize the race start technique used in athletics for swimmers at the Cerro Pelado Sports School (Eide), in Camaguey. The procedure used permitted to providing a rationale for the scientific results, determining the practical regularities, and processing data. The methodological alternative designed consists of four stages comprising special ground and water exercising, which provide swimming skills, as well as methodological guidelines for practical implementation. The users consulted considered that the scientific results to lessen swimmers' weaknesses were favorable.

**Keywords:** Swimming, optimization, race start.

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## RESUMEN

Se realizó una investigación con el objetivo de diseñar una alternativa metodológica para el perfeccionamiento de la técnica de salida de atletismo en nadadores escolares de la Eide "Cerro Pelado" de Camagüey. Los procedimientos empleados permitieron fundamentar el resultado científico, determinar las regularidades de la práctica y; procesar los datos. La alternativa metodológica diseñada consta de cuatro etapas con ejercicios especiales en tierra y agua que propician la adquisición de habilidades en los nadadores; así como orientaciones metodológicas para su implementación en la práctica. Los usuarios consultados consideran favorable el resultado científico para atenuar las debilidades de los nadadores.

**Palabras clave:** natación, perfeccionamiento, salida de atletismo.

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## RESUMO

Foi realizada uma investigação com o objetivo de projetar uma alternativa metodológica para a melhoria da técnica de iniciação ao atletismo em nadadores escolares do Eide "Cerro Pelado" de Camagüey. Os procedimentos utilizados tornaram possível basear o resultado científico, determinar as regularidades da prática e processar os dados. A alternativa metodológica projetada consiste em quatro etapas com exercícios especiais em terra e na água que favorecem a aquisição de habilidades nos nadadores, bem como diretrizes metodológicas para sua implementação na prática. Os usuários consultados consideram o resultado científico favorável a fim de atenuar as fraquezas dos nadadores.

**Palavras-chave:** natação, aperfeiçoamento, início do atletismo.

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## INTRODUCTION

Swimming is a time and record sport, in which athletes and coaches aim to set new records. Today, quite a few specialists Zuña Mora, J. Ángel, & Gutiérrez Cruz, M. (2019), Fonseca Aguilar, I. de J., Fonseca Castañeda, I. A., & Fonseca Castañeda, D. de J. (2019), Leyva-González, H., Álvarez-Berta, L. M., & Mesa-Anoceto, M. (2020), and Costill, D. L. / Maglischo, Ernest W. / Richardson, A. B. (1998), Álvarez Rojas *et al.* (2019) among others, consider that the main premise to achieve high sport performance is technical development. Hence, new studies focused on the optimization of that element have become a key factor that brings about optimum performance possibilities, and that helps accomplish the challenges of customized training established by coaches on an athlete-by-athlete basis.

High performance swimming today has reached significant results thanks to the implementation of science and technology objectively and accurately. Authors Costill, D. L. / Maglischo, Ernest W. / Richardson, A. B. (1998), Leyva-González, H., Álvarez-Berta, L. M., & Mesa-Anoceto, M. (2020) determined that, in the various speed swimming distances the role of the several components of the activity's structure lack uniformity.



The outcome in the 50 m is determined, likewise, by the start, the last leg, and the speed in the mid leg of the competition. In the longest distances, particularly, the 200 m, the relevance of the mid leg, including the turn, is even greater, with a lower relevance for the last leg, and the start. The 100 and 200 m results are equally determined by the efficacy of the turn.

The general assessment of the behavior of biokinematic features helped determined the technical errors made by the athlete in the study. The identification of the major shortcomings was observed in the initial position and the start time, as well as the coordination of movements.

Some of the results of the diagnostic performed are shown below:

- The most commonly occurring errors at these ages are not presented, including the methods and organizing procedures that could be used to deal with the technical deficiencies in the start, as well as examples of technical exercise that can be assumed to meet the expected goals.
- Some coaches at the national level fail to consider the enhancement of the start as an important element sports events, as they are tackled just occasionally (two or three times), in the speed legs, rather than being planned as another training element with the same relevance and interest.
- Poor results in the technical tests during the assessment of the swimming techniques.
- Little effectiveness of start, water entry, and deep exit movements during the competition.
- Disqualifying caused by false starts and faulty execution of movements in the subaquatic phase.

Given the relevance of this topic, this study aims to design a methodological alternative to optimize the race start technique used in athletics for swimmers at the Cerro Pelado Sports School (EIDE), in Camaguey.

## ***MATERIALS AND METHODS***

The research relied on methods and techniques that provided a theoretical rationale for the methodological alternative, its layout, and data processing for practical implementation.

An intentional non-probabilistic sample of 13 athletes was selected from the junior categories at the Cerro Pelado Sports School (EIDE), in Camaguey, Cuba. the individuals represented 52 % of the population (25), including experienced males and females in every category.



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## RESULTS AND DISCUSSION

A characterization of the technical execution of athletics start, in junior swimmers, resulted that on the standing position, 77 % was assessed as good and very good, whereas 23 % was between average and bad, with difficulties associated to the lack of focus on the front edge of the starting block, thus diminishing stability, and on one occasion, the foot slipped during the initial thrust.

At start or drive, only 23 % was assessed very good and good, whereas 77 % was in the average and bad range, being the most affected phase, with deficiencies in stance or the drive, when the extension of the lower limbs was not strong enough, and the second part of the drive is more upward than forward, causing the initial drive intensity and flight to decrease. During the flight, 54 % was assessed between very good and good, whereas 46% was between average and bad. Most difficulties were associated with little or no control of the body during the flight, causing a decrease in the flight and increased water waves.

In the entry, like the previous phase, 54 % was assessed between very good and good, whereas 46 % was between average and bad. Most difficulties were associated with the entry with legs flexed by the knees and very superficial, causing a decrease in deep movements and higher wave density and time before starting swimming.

In the gliding, 77 % was between very good and good, whereas 23 % was assessed between average and bad. In this case, the gliding was very superficial, with a lack of coordination and fluency of movement speed. In freestyle drive, 62 % was between very good and good, whereas 38 % was assessed between average and bad. In this case, the shortcomings were detected associated with the lack of the dolphin movement followed by alternate kicking, leading to a decrease in movement speed.

In butterfly style drive, 62 % was between very good and good, whereas 38 % was assessed between average and bad. In this case, the shortcomings were detected in the first-cycle breathing, increasing the wave intensity and lowering the speed movement. In freestyle drive, 30 % was between very good and good, whereas 70% was assessed between average and bad, being the most affected style. In this case, the shortcomings were associated with the lack of the deep subaquatic movements causing no time marking between the arms and legs movements, and hindering the start. At start time, 46 % was within very good and good, whereas 54 % reached averaged and bad.

Goal: to optimize the training of race start in athletics in junior swimmers at the Cerro Pelado Sports School (EIDE), in Camaguey, through a set of exercises customized according to the individuals, their preparedness level, and the regularities of competition.

The methodological alternative relies on the design of special exercises that can be repeated quickly and easily, including high efforts. These exercises will be arranged coherently and will constitute the base of technical training organization of swimmers, with a systemic and integrated character with a contemporary conception.



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*Stage I. analysis of the context and determination of the training context*

*1. Coordination of material and human resource functions*

- Coaches should make proper use of methods, aids, space, and time for sports practice.
- They should pay attention to the individual athletes' traits and needs with more or less potential or technical skills, and fitness.

The exercises in this alternative were conceived under the several aspects related to the technical preparedness of junior swimmers. Considering the phases that make race start in athletics, the following techniques will be dealt with: stance technique, drive, water entry, and the subaquatic phases. Each exercise will include the following organizational aspects: objective, development, methodological guidelines, and possible variants.

*I. Creation of conditions for technical training*

- To stimulate the search, contextualization, and the creation of aids, activities, and strategies that permit athlete comprehensive development, and to assess their evolution over time.

*Stage II. Organization and planning of training tasks for race start in athletics*

Special ground and water exercises were designed, and included the objective, description, methods, dosage, and training time.

*Special ground exercises*

*Specific objectives of ground exercises:*

- a) To optimize the drive phase and enhance drive strength.
- b) To synchronize the set phase with the drive and jump, as well as to enhance the coordination of leg and arm movements.
- c) To start using several stimuli and time changes to enhance simple reaction quickness.
- d) To make the start in different conditions to enhance the drive phase when starting.

*Methodological guidelines*

- To utilize arm movements correctly, along with the jump and related exercises.
- These should be trained systemically, two or three times a week.
- Arm, leg, and trunk movements should be synchronized.
- The series will consist of ten jumps. A training unit should comprise four series of ten jumps each. The recovery breaks will depend on the swimmer, and should be active.



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*Special water exercises*

I. The flight phase:

Objective:

- a) To optimize the drive phase and enhance drive strength.
- b) To synchronize the drive phase with the water entry, as well as to enhance the drive strength.
- c) Synchronization and optimization of the flight phase under different start conditions.

II. Sub aquatic phase:

Freestyle technique

Objective: To synchronize the flight and subaquatic phases, and to enhance the start using the freestyle technique.

Butterfly technique

Objective: To synchronize the flight and subaquatic phases, and to enhance the start using the butterfly technique.

Breaststroke technique

Objective: To synchronize the flight and subaquatic phases, and to enhance the start using the breaststroke technique.

Methodological guidelines

- The strongest drive should be done with the leg behind.
- To utilize arm movements correctly, along with the jump and related exercises.
- The flight phase should be done linearly to avoid taking up too much time, and therefore delayed contact with the water.
- These should be trained systemically, four to five times a week.
- The subaquatic movements of the breaststroke technique should include gliding between the push, the kick, and the start of swimming.
- To perform these exercises at the beginning of class, preferably.

*Stage III Partial control of the race start technique used*

The qualitative analysis of swimming is associated with the detection and analysis of the technical error Costill, D. L. / Maglischo, Ernest W. / Richardson, A. B. Authors Costill, D. L. / Maglischo, Ernest W. / Richardson, A. B. (1998). A technical error (or technical fault) are deviations from the most efficient model of a given motor skill in swimming.



The systematization of the main errors observed in the four swimming styles, in terms of starts and turning in an educational environment, along with their biomechanical consequences, causes, and hypothetical forms of intervention, coincide with Fernández Yero, L. V., Tamayo Rodríguez, R. M., & Guerra Martínez, R. (2020).

To achieve greater easiness of didactics, the technical faults have been pooled depending on the performance phases described by Costill, D. L. / Maglischo, Ernest W. / Richardson, A. B. (1998), and contextualized for this study: swimming (stance, action of the lower and upper limbs, synchronization of the upper limbs, synchronization between the lower limbs and the upper limbs, synchronization of the upper limbs and breathing), in the start (stance, drive, flight and water entry, gliding and swimming), and turning (approximation to the wall, turning, gliding, and swimming again). Each possible cause of these errors has been studied.

#### *Stage IV Comprehensive assessment of the race start technique used*

To evaluate stage effectiveness, certain elements should be elucidated, since they characterize the assessment, so that it measures athlete progress throughout the process. Based on the partial results achieved through teacher observation, the technical preparedness can be determined in the swimmers in the controls, comparing with the execution time at start, which may also be compared to aspects dealt with by Leyva-González, H., Álvarez-Berta, L. M., & Mesa-Anoceto, M. (2020).

At this stage, the information collected from the partial controls enabled an approximation to a very significant factor in swimming training, technical skill acquisition, which characterizes by an ideal rhythmic stability. In other words, the swimmer may face the test in all the conditions that can take place, in the easiest possible way.

It may also be related to anthropometric profiles of athletes and the distance used, the establishment of premises that permit verification of the physical and technical adjustment with the assistance of the customized contents, as dealt with by Palacio Sánchez, E. V., Escalona Delfino, C. M., & Méndez Álvarez, T. Y. (2019).

The above helps making inferences in a bidirectional sense; that is, when an athlete has certain anthropometric parameters, at start, they should make it at a time that corresponds to the extent of a very high comprehensive technical efficiency index to be assessed favorably, in order to be able to close the gap with world-class athletes.

Upon its realization, the final optimum condition will be achieved by the swimmer. It is understood as the moment in which the technical referenced optimization can be accomplished, based on the athlete's condition, in keeping with the anthropometric profiles identified that ensure a coherent and personalized execution of the race start in athletics.

Hence, reaching this condition is the end and also the beginning of a continuous and systematic process is intended to find a qualitatively higher level reached in the next training cycles, depending on the commitments made for competitions. Below are the



instruments and methods used to control the dimensions and indicators for this phase (Figure 1).



Fig. 1. - Graphic representation of the methodological alternative

*Theoretical assessment of the methodological alternative by user's opinion*

A total of 10 experts were consulted: the provincial Commissioner, the technical head of the provincial Commission, the head of the EIDE department, two swimming teachers from the Faculty of Physical Culture, and five coaches in the province with the highest achievements in the country. All the experts agreed with the methodological alternative, with a very appropriate assessment. They also said that the exercises suggested are recommendable for further applicability, and offered their views on the improvement of the methodology as a whole.

## CONCLUSIONS

The diagnostic performed to the sample revealed shortcomings in the drive phase, little or no body control in the flight phase, and entry with the legs flexed and very superficially, limiting aquatic movements.

The methodological alternative was designed according to the aspects of present-day-sports training, such as the coordination of material and human resources, the organization and planning of training tasks, partial observation of the race start in athletics, and the assessment of execution.

The experts considered that the structure of exercises, the relationship among their components, and the goals of the junior category, as well as its practical and methodological usefulness were satisfactory.





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*Conflict of interest statement:*  
The authors declare no conflicts of interests.

*Author contribution statement:*  
**Danniuvys Martínez Pedro:** Introduction, results, and discussion, references.  
**José Ignacio Ruiz Sánchez:** Methods, results and discussion, conclusions.



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