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# Ciencia y Deporte



## *Methodology for developing the technical skill of pendulum movement in boxing*

[*Metodología de desarrollo de la habilidad técnica del movimiento pendular en el boxeo*]

[*Metodologia da ensino e aprendizagem a técnica do movimento pendular no boxe*]

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### **ABSTRACT**

The topic addressed here relates to the teaching and learning process of the pendulum movement as a technical skill in boxing. The initial diagnostic assessment revealed shortcomings, including limitations in the theoretical, methodological, and practical subcontracting of the teaching and learning process for developing the pendulum movement technique in boxing, as well as a lack of pathways and procedures for its development that demonstrate an integrative approach. All of this points to inadequate execution of this technique by boxers in practice. Based on these findings, the following research question is formulated: How can the pendulum movement

technique be developed in boxing? This proposal is aimed at boxing coaches to contribute to the improvement of the teaching and learning process for this technique. The objective is to develop a methodology with an integrative approach to developing the pendulum movement technique in boxing. This research employed various scientific methods: theoretical, empirical, and mathematical and/or statistical, which allowed for the development of the methodology for developing the pendulum movement technique in boxing. The study was conducted with boxing coaches of the youth category, working in sports complexes in Guantánamo province. The feasibility of the scientific result was assessed through expert review. The favorable results obtained allow us to conclude that the methodology is feasible for implementation in sports practice.

**Keywords:** technical skill, pendulum movement, teaching and learning, boxing, methodology.

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## **RESUMEN**

La temática a tratar está relacionada con el proceso de enseñanza y aprendizaje del movimiento pendular como habilidad técnica en el boxeo. Al aplicar el diagnóstico inicial, se determinaron insuficiencias como limitaciones en el subcontrato teórico, metodológico y práctico desde el proceso de enseñanza y aprendizaje para desarrollar la habilidad técnica del movimiento pendular en el boxeo, así como, carencias de vías y procedimientos para su desarrollo que denoten un enfoque integrador. Todo ello, permite evidenciar una inadecuada ejecución de dicha técnica por los boxeadores en la praxis. Por tales resultados, se formula el problema científico: ¿Cómo desarrollar la habilidad técnica del movimiento pendular en el boxeo? La propuesta está dirigida a los entrenadores de este deporte en función de contribuir al perfeccionamiento del proceso de enseñanza y aprendizaje de la técnica objeto de estudio. Se traza como objetivo elaborar una metodología con un enfoque integrador de desarrollo de la habilidad técnica del movimiento pendular en el boxeo. En esta investigación se aplicaron diversos métodos científicos: teóricos, empíricos y matemático y/o estadístico, lo que permitió elaborar la metodología de desarrollo de la habilidad técnica del movimiento pendular en el boxeo. El estudio se realizó con entrenadores de boxeo de la categoría pioneril, que laboran en combinados deportivos de la provincia Guantánamo. La factibilidad del resultado científico se valoró mediante el criterio de expertos. Los resultados favorables que se obtienen permiten concluir que la metodología es factible para su implementación en la práctica deportiva.

**Palabras clave:** habilidad técnica, movimiento pendular, enseñanza y aprendizaje, boxeo, metodología.

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## **RESUMO**

O tema aqui abordado relaciona-se com o processo de ensino e aprendizagem do movimento pendular como habilidade técnica no boxe. A avaliação diagnóstica inicial revelou deficiências como: limitações nos aspetos teóricos, metodológicos e práticos do processo de ensino e aprendizagem para o desenvolvimento da técnica do movimento pendular no boxe, bem como a inexistência de caminhos e procedimentos para o seu desenvolvimento que demonstrem uma abordagem integrativa. Tudo isto aponta para a execução inadequada desta técnica pelos pugilistas na prática. Com base nestas constatações, formula-se a seguinte questão de investigação: Como se pode desenvolver a técnica do movimento pendular no boxe? Esta proposta destina-se a treinadores desta modalidade desportiva, contribuindo para a melhoria do processo de ensino e aprendizagem da técnica em estudo. O objetivo é desenvolver uma metodologia com uma abordagem integrativa da desenvolvimento a técnica do movimento pendular no boxe. Esta investigação aplicou diversos métodos científicos: teóricos, empíricos e matemáticos e/ou estatísticos, que permitiram o desenvolvimento de uma metodologia da melhorar a capacidade técnica do movimento pendular no boxe. O estudo foi conduzido junto de treinadores de boxe da categoria júnior, ativos em complexos desportivos na província de Guantánamo. A viabilidade do resultado científico foi avaliada através de revisão por especialistas. Os resultados favoráveis obtidos permitem concluir que a metodologia é viável para implementação na prática desportiva.

**Palavras-chave:** habilidade técnica, movimento pendular, ensino e aprendizagem, boxe, metodologia

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## **INTRODUCTION**

School sports, particularly at the youth level and specifically sports education within it, have suffered from a notable neglect or theoretical void within the Cuban sports context. The few authors who have addressed this topic have done so from a high-performance perspective; among them, Noa (2016) stands out. However, very few have analyzed it

from the perspective of educational sports practice, which has been largely influenced by the strong emphasis on championships that has characterized it.

Hence, teaching is an important means for the development of the pioneering boxer, for the instruction and education of this athlete who begins his sports training, where two components are differentiated: the activity of the coach and the learning of the boxers.

During the course of this research, it has been observed that many authors, both internationally and nationally, have explored the teaching and learning of the technical fundamentals of boxing. Their work forms valuable links for the foundation of this scientific article.

Internationally, this emphasis is further highlighted by Rezzonico (2021), León and Alvarado (2024), Toro and Landasuri (2024), and Novo (2025). These authors concur in emphasizing the importance of teaching and learning the fundamental techniques of boxing, starting with fighting stances, footwork, turns, fundamental punches and defenses, as well as the methodology for teaching each of these. However, regarding pendulum movement within the proposed models, its recognition as a technical skill in this sport is limited.

At the national level, the following authors stand out: Sánchez-Rodríguez (2020); Vázquez (2020); Vélez (2020); Ramos and Barrios (2023); and Torres (2025), who provide reviews related to the consistent application of the theoretical, methodological, and practical elements of boxing. These works encompass the essential knowledge necessary for training coaches responsible for developing boxers from a young age. Furthermore, these authors contribute a logical structure for a methodology for teaching the technical aspects of boxing, tailored to the Cuban School of Boxing (ECB).

The studies analyzed above corroborate the scarce reference to pendulum movement from theory, without conceiving it as a technical skill within the didactic models for teaching and learning this sport, which constitutes a barrier in the training of boxers who begin sports training.

During a study of normative documents on technical preparation related to the Comprehensive Athlete Preparation Program (PIPD), observations of classes, competitions, surveys, and interviews with boxing coaches working in sports training areas with the pioneer category, limitations were found from a theoretical standpoint, including a lack of knowledge of the essential content of pendulum movements, the absence of a methodology for teaching this technical component, and a deficient selection of exercises, methods, means, and procedures for guiding pendulum movements in pioneer boxers.

In training sessions, while developing theoretical and practical skills, the boxers demonstrate inadequate execution of technique, including: loss of rhythm when performing the pendulum movement, lack of coordination, jumping, incorrect integration of the pendulum movement with other fundamental techniques when facing an opponent, and improper footwork. All these deficiencies limit the development and performance of these young boxers when facing an opponent in any competitive event.

Based on the results of the diagnosis carried out and the author's professional and research experience, the following main shortcomings were identified:

- Limitations in the theoretical, methodological and practical order to develop the technical skill of the pendulum movement in the teaching and learning process of boxing.
- Lack of pathways and procedures to develop the technical skill of pendulum movement with an integrative approach.
- Inadequate execution of the pendulum movement by the pioneering boxers in practice.

These shortcomings allow us to determine the following scientific problem: How to develop the technical skill of pendulum movement in boxing?

Taking into account the shortcomings previously mentioned and in order to solve the identified scientific problem, the following objective is proposed: to develop a methodology for developing the technical skill of pendulum movement in boxing.

## ***MATERIALS AND METHODS***

During the investigation, the study focused on 14 boxing coaches working in the youth category, in seven sports complexes in the Guantánamo province; in addition, two directors of this sport and 12 boxers representing 50% of a total of 24 who represented the provincial pre-selection with a view to participating in the national games of this category in 2024, with the objective of obtaining opinions about the problem being investigated.

Different methods were used for the development of the research, including theoretical, empirical, mathematical and/or statistical methods.

Twelve training sessions were observed, taking into account seven indicators, all related to the didactic components (lesson planning, objective orientation, content, methods, resources, dosage, and evaluation method). These indicators showed that 78.7% were categorized at the negative level (N) and only 21.3% at the positive level (P). This demonstrates that the pendulum movement is not part of the technical skills of pioneer boxing within the PEA (Program for Early Childhood Education). For the reasons stated above, the coaches show deficiencies in their planning; by planning according to their own criteria, they omit the characteristics that connect the other technical elements of pioneer boxing.

When establishing the relationship between the non-personal components of the boxing teaching and learning process—objectives, content, methods, resources, procedures, and forms of evaluation—their functionality reveals a lack of a systemic and integrative approach. All these limitations result in insufficient actions for developing the technical skill of pendulum movement in boxing during the teaching and learning process, both for coaches and novice boxers.

On the other hand, surveys and interviews were applied to coaches and athletes under study, in order to know criteria about the PEA of the pendulum movement as a technical skill of boxing, as well as the knowledge they possess about the ways and procedures to develop the technical

skill of the pendulum movement in boxing and, in turn, obtain information about its particularities, in addition to the relationship with the other technical elements that make up this sport.

An analysis of the coaches' survey, conducted to assess their training in teaching and learning the movement technique, revealed a low level of theoretical and methodological understanding for addressing this technical element in young boxers. These young boxers lack knowledge of the technique under study. This situation warrants concern from administrators and coaches, highlighting the need to focus on developing the pendulum movement technique in boxing from an early age throughout the entire boxing program.

An analysis of the most recent Comprehensive Athlete Preparation Programs (PIPD) from the 2017-2020 and 2021-2024 cycles (p. 22) by a group of authors (2017-2024) revealed that the pendulum movement is established as a key technical element within the methodology for teaching boxing to young boxers in the 11-12 age group. However, when reviewing the technical and tactical skills to be mastered in each phase (adaptation, development, and consolidation), this technical element is limited to a single skill in boxing instruction; similarly, no combination or interconnection with other techniques is observed in any of the stages. In the opinion of the authors of this work, this may hinder the developmental progress of boxers beginning their training and, consequently, their competitive results in their age group. All of this contributed to the verification of the established hypothesis.

## ***RESULTS AND DISCUSSION***

After analyzing the diagnosis, it is considered that the fundamental aspect of the research is the shortcomings in the procedures to develop the technical skill of the pendulum movement in boxing in pioneer boxers.

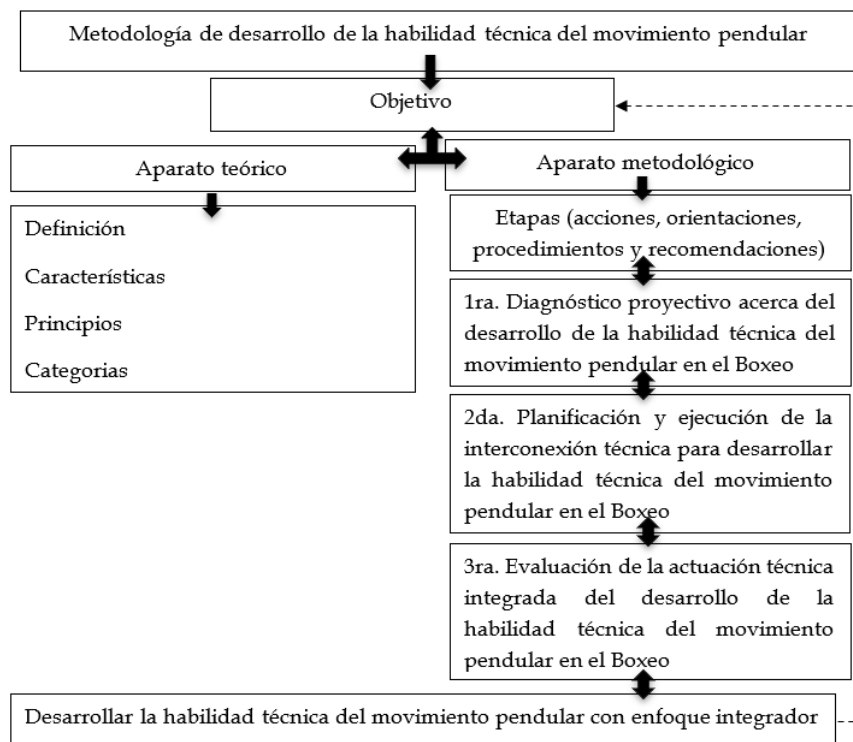
If one takes into account the visible need between the technological demand of boxing in the pioneer category and the lack in the sports practice of methodological ways in this regard, the need to employ a methodology for the teaching-learning of the pendulum movement during the preparation of beginners in boxing becomes evident.

For the construction of the methodology, the criteria of Torres, Mengana, Osorio, Dopico & Milán (2023) are assumed, which are the criterion that a methodology is the possibility of assuming a task that consists of stages and actions well oriented methodologically, which will serve to direct the solution of the problems that arise in the educational management, starting from real needs; in this there must be coherence in each of the stages of orientation, execution and control, according to the objectives proposed by the teaching and from the integral diagnosis of the sample.

Taking into account the above, the methodology aims to: Enable boxing coaches, with all the theoretical apparatus and methodological platform of knowledge to develop the technical skill of the pendulum movement in boxing.

The methodology is structured with two components: a theoretical one and a methodological one. Together, these create a synergy that reflects the application of the systemic structural-functional method. The methodological component consists of three stages (diagnosis, planning and execution, and evaluation), with their respective actions, guidelines, procedures, and recommendations. These constitute the fundamental components of this system, enabling boxing coaches to effectively meet the demands of the pendulum movement technique in novice boxers.

1 below presents a graphical representation of the methodology for developing the technical skill of the pendulum movement in boxing (Figure 1).



*Fig. 1 - Graphic representation of the methodology for developing the technical skill of the pendulum movement in boxing*

The essence of the structural apparatus of the methodology is described below.

The theoretical apparatus of the methodology is given in the foundations provided by the didactic model with its respective subsystems, categories, definition, characteristics, principles and assumptions that support the development of the pendulum movement.

Regarding the methodological apparatus, it is integrated from stages with their respective actions, orientations, procedures and recommendations, which are set out below.

projective diagnosis for the categorical establishment of the technical execution of the pendulum movement in pioneer boxing, contributes to the achievement of awareness to diagnose the initial state, development and evaluation of the technical element under study, so it is suggested to take into account the following requirements:

- Determination of the specific actions that will be diagnosed to evaluate the teaching and learning of the pendulum movement technique in pioneer boxing.
- Selection of the methods and techniques necessary to be used in the diagnosis to declare the deficiencies of the teaching and learning process of the pendulum movement technique in pioneer boxing.
- Development of the instruments to be applied, such as: observation, interviews, surveys, rating scales, to evaluate the current state of the teaching-learning process of the pendulum movement technique in youth boxing (Date: December, 2025).
- Channeling and interpretation of the results obtained in each of the diagnosed dimensions to present a detailed conclusion of the results.
- Accurate establishment of the current state of the teaching and learning process of the pendulum movement technique in trainers and pioneer boxing.
- Diagnosis of the situation presented by boxing managers in the province in relation to the organization of the teaching-learning process of pioneer boxing.

The second stage, corresponding to planning and execution, is primarily focused on the coach. This aligns with the need to consider the didactic interaction that occurs between coach and boxer during the training program, taking into account their psychological characteristics, interests, and motivations.

In this phase, it is necessary to take the following into account:

- Organization of methodological activities with the coaches who work with boxers of the pioneer category in the municipality of Guantánamo, to characterize the pendulum movement technique during the teaching-learning process and achieve greater concretion of this technical element and its interconnection with the others.
- Planning the organizational levels of methodological work based on the tasks to perfect the teaching and learning process of pendulum movement in pioneer boxing.
- Development of lectures on the technical fundamentals of boxing, emphasizing the teaching and learning process of the pendulum movement of pioneer boxing within the framework of the 60th National School Games, July 2025.
- Planning exercises for the pendulum movement of initial teaching and with combat rhythm, taking into account its methodology, which allows perfecting the teaching and learning process of this technique in pioneer boxers.

- Formulation of the proposed objectives

Precision of the content of the pendulum movement in pioneer boxing that is to be developed, the goals to be achieved and the changes that are expected to be obtained in the skill of the technique under study.

- Selection of content (technical and tactical skills) related to the pendulum movement in the pioneer boxer, allowing him to interact with his object and give it a theoretical-practical treatment in the PEA to expand the level of knowledge of boxing.
- Proposal of methods in accordance with the objective and content to be developed, which enables the active participation of the boxer during the PEA for the mastery of the technical skill of the pendulum movement and its interconnection with the other technical and tactical elements of pioneer boxing.
- Selection of the appropriate organizational means for the proper development of the technical skill of pendulum movement in pioneer boxing.
- Definition of the frequency and time for the development of the pendulum movement technique of pioneer boxing during the PEA.

To design theoretical and practical assessments that promote the cognitive development of the pioneering boxer

To achieve the development of the technical skill of the pendulum movement in pioneer boxing, the coach must take into account the following requirements:

- Full mastery of the contents of the pioneer category teaching program.
- Theoretical and practical knowledge of the technical fundamentals of boxing.
- Knowledge of the methodology for teaching the technical elements of boxing
- To understand the methodology for teaching the pendulum movement technique in its two variants in pioneer boxing.
- Theoretical and practical mastery of the pendulum movement technique in boxing.
- Selection of methods and means for teaching pendulum movement in pioneer boxing.
- Determining the variety of exercises for teaching and learning the pendulum movement in pioneer boxing.
- The orientation of the exercises for teaching and learning the pendulum movement must respond to the technical difficulties presented by pioneer boxers.

- Identifying errors in the pendulum movement technique in the pioneer boxer.

Everything planned in advance gives way to the execution of the actions conceived in the previous stages. To do this, it is necessary to consider the following:

- Concrete action in the practice of everything planned for the teaching and learning of the pendulum movement in pioneer boxing.

Everything planned should outline and promote the improvement and evolution of the teaching and learning process of the pendulum movement technique in novice boxers. The arguments presented contribute to systematic, dynamic, and systemic participation in the teaching and learning process of the pendulum movement technique in novice boxing. To this end, it is necessary to consider the requirements of each phase.

The first two stages constitute the starting point for implementing the methodology. These stages will raise awareness among the coaches and yield the results of the pedagogical assessment of their actual training needs for developing a combined skill set for teaching and learning the pendulum movement technique in youth boxing.

When referring to the 3rd stage, it was taken into account that in the control and evaluation the results of the work of coaches and boxers are compared with the proposed objectives to determine the efficiency of the PEA and consequently reorient the work and decide if it is necessary to work again, on the same objectives or on part of them, with all or some boxers; at the same time, it is checked whether the path followed in the teaching process was adequate or not.

To evaluate the content in the theoretical classes, the coach can use different types of controls:

1) Systematic control; these can be divided into:

- a) Preliminary review: These are the ones who diagnose the current condition of the boxers.
- b) Systematic analysis: It is a product of the constant interaction between coach and boxer, which allows us to know how the boxer's technical and tactical skills are being assimilated.

This phase concludes the period and provides insight into how the work was evaluated. The following aspects must be considered:

1. The evaluation of the technique Theoretical projection of the pendulum movement and pendulum movement with combat rhythm as a term of effectiveness in the teaching-learning of pioneer boxing
2. The introduction of the technique Theoretical projection of pendulum movement and pendulum movement with combat rhythm within the methodology for teaching boxing, in search of projections to improve the results of pioneering boxing
3. The introduction of different practical actions to improve the teaching and learning of the pendulum movement in its two variants in pioneer boxing
4. The use of the instrument (methodology) to enhance the evaluation of pendulum movement individually and as a team in pioneer boxers.

After explaining the essence of the methodology for developing the technical skill of pendulum movement in boxing, it was demonstrated that the proposed structure is in line with the requirements proposed by the various authors mentioned above.

In line with the above, Ramos and Barrios (2023) and Torres (2025) agree in highlighting the importance of teaching and learning the technical fundamentals of boxing, starting from fighting stances, footwork, turns, fundamental punches and defenses, as well as the methodology for teaching each. Following this line of thought, the proposed methodology considers and recognizes the development of the pendulum-like movement technique in boxing.

This confirms the findings of León and Alvarado (2024), Toro and Landasuri (2024), and Novo (2025), who reviewed the consistent application of theoretical, methodological, and practical elements of boxing. Their work encompasses the essential knowledge required for coaches responsible for training boxers from a young age. The present methodology, with its logical structure for developing the pendulum movement technique, contributes to refining the technical aspects of the Cuban School of Boxing (ECB).

## **CONCLUSIONS**

The study of the theoretical and methodological foundations of the teaching and learning process of the pendulum movement technique in Boxing, facilitated the

structuring of a methodology as a practical contribution, based on an integrative and systemic approach.

The proposed methodology constitutes a way to improve the teaching-learning process, the pendulum movement technique in pioneer boxers, whose essence is to achieve the appropriation of knowledge and the development of skills on a higher level than those normally obtained.

The methodology, containing its theoretical and methodological foundations, shows the relationships of interdependence and mutual conditioning, allowing the achievement of scientific precision and practical feasibility to improve the teaching and learning process of the pendulum movement in the pioneer boxer.

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***Conflict of interest:***

The authors declare no conflict of interest.

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Instrument application: Andrés Fuentes Domínguez.

Data collection from applied instruments: Andrés Fuentes Domínguez.

Statistical analysis: Eudis Milán Leyva.

Creation of tables, graphs, and images: Eudis Milán Leyva.

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Revision and final version of the article: Eudis Milán Leyva.

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Authorship coordination: Andrés Fuentes Domínguez.

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Review of the application of the bibliographic standard: Felipe Enio Robas Díaz.



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