The teaching of the elements of difficulty in sports aerobic gymnastics

La enseñanza de los elementos de dificultad en la gimnasia aeróbica deportiva

O ensino dos elementos de dificuldade na ginástica aeróbica esportiva

MSc. Anisleidy Abreu-Arranz*, https://orcid.org//000-1737 1038

*anisleidyaa90@gmail.com**

Lic. Dailyn González-Rosellol, https://orcid.org//0000-0002-9722-2149

Dr. C. Yusimil Ramos-Quian, https://orcid.org//0000-0003-3488-5700

Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo", La Habana, Cuba

Recibido: octubre/2022 **Aceptado: diciembre/2022**

Abstract

The present investigation is developed from the deficiencies detected in the use of the elements of difficulty of Sports Aerobic Gymnastics in the Camagüey 2017 national university competition. a significant number of errors in the execution of these movements during the event, plus teaching of the elements of difficulty based on elements related to Rhythmic Gymnastics and Artistic Gymnastics, demanded a prompt scientific investigation in this regard. Regarding the teaching of Aerobic Sports Gymnastics, several authors have dealt with the instruction of some elements of difficulty. Even so, there are other elements, typical of this sport, of which there are no declared forms for its teaching in the Cuban university context. When analyzing the deficiencies, it was detected that the cause of the problem lies in the fact that the coaches do not have ways to teach the elements of this sport, which is why the objective of the investigation is drawn up: to develop a methodological model for the teaching of the elements of difficulty for the university teams of Sport Aerobic Gymnastics, using theoretical and empirical methods such as: analysis-synthesis, modeling, document review and interview. The work covers different criteria that make up the intrinsic elements of a model: the objective, the indicators that describe the content and the guidelines for its application. The solution of the methodological model for the teaching of the elements of difficulty of Aerobic Sports Gymnastics, generates positive general results, of impact to the problem posed.

Keywords: Elements of Difficulty, Aerobic Sports Gymnastics, Methodological Model, Camagüey National University Competition 2017.

Resumen

La presente investigación se desarrolla a partir de las deficiencias detectadas en el empleo de los elementos de dificultad de la Gimnasia Aeróbica Deportiva en la competencia nacional universitaria Camagüey 2017. un número significativos de errores en la ejecución de estos movimientos durante el evento, más la enseñanza de los elementos de dificultad basada en elementos afines a la Gimnasia Rítmica y la Gimnasia Artística, exigieron una pronta indagación científica al respecto. En cuanto a la enseñanza de la Gimnasia Aeróbica Deportiva, varios autores han

tratado la instrucción de algunos elementos de dificultad. Aun así, existen otros elementos, propios de este deporte, de los cuales, no aparecen declaradas formas para su enseñanza en el contexto universitario cubano. Al analizar las deficiencias, se detectó que la causa del problema estriba en que los entrenadores, no cuentan con formas para la enseñanza de los elementos propios de este deporte, por lo que se traza como objetivo de la investigación: elaborar un modelo metodológico para la enseñanza de los elementos de dificultad para los equipos universitarios de Gimnasia Aeróbica Deportiva, utilizándose métodos del nivel teórico y empírico tales como: el análisis-síntesis, la modelación, la revisión documental y la entrevista. La obra abarca diferentes criterios que conforman los elementos intrínsecos de un modelo: el objetivo, los indicadores que describen el contenido y las orientaciones para su aplicación. La solución del modelo metodológico para la enseñanza de los elementos de dificultad de la Gimnasia Aeróbica Deportiva, genera resultados generales positivos, de impacto al problema planteado.
Palabras clave: Elementos De Dificultad, Gimnasia Aeróbica Deportiva, Modelo Metodológico, Competencia Nacional Universitaria Camagüey 2017.

Resumo

A presente investigação se desenvolve a partir das deficiências detectadas no uso dos elementos de dificuldade da Ginástica Aeróbica Desportiva na competição universitária nacional Camagüey 2017. um número significativo de erros na execução desses movimentos durante o evento, além do ensino dos elementos de dificuldade fundamentada em elementos relacionados à Ginástica Rítmica e à Ginástica Artística, demandaram uma pronta investigação científica a esse respeito. No que diz respeito ao ensino da Ginástica Aeróbica Desportiva, vários autores têm abordado o ensino de alguns elementos de dificuldade. Ainda assim, existem outros elementos, típicos deste esporte, para os quais não existem formas declaradas para seu ensino no contexto universitário cubano. Ao analisar as deficiências, detectou-se que a causa do problema reside no facto de os treinadores não terem meios para ensinar os elementos deste desporto, razão pela qual se traça o objetivo da investigação: desenvolver um modelo metodológico para o ensino dos elementos de dificuldade para as equipes universitárias de Ginástica Aeróbica Esportiva, utilizando métodos teóricos e empíricos como: análise-síntese, modelagem, revisão documental e entrevista. O trabalho abrange diferentes critérios que compõem os elementos intrínsecos de um modelo: o objetivo, os indicadores que descrevem o conteúdo e as diretrizes para sua aplicação. A solução do modelo metodológico para o ensino dos elementos de dificuldade da Ginástica Aeróbica Esportiva, gera resultados gerais positivos, de impacto ao problema proposto.
Palavras-chave: Elementos de Dificuldade, Ginástica Aeróbica, Modelo Metodológico, Competição Universitária Nacional de Camagüey 2017.

Introduction

Aerobic Sports Gymnastics (GAD) as a coordination sport and competitive art, fundamentally requires mastery of coordination capacities and artistic expressions (González, 2020). The exercises are aimed at the quality in the execution of the movements. The fact that the appreciation for the activity of the judges is a

determinant in obtaining high competitive results, gives this sport a hallmark (Valdés, 2010).

Among the components that make up the GAD routine are: aerobic movement patterns, transitions and links, lifts or cleans, physical interactions, and elements of difficulty. The latter, according to the International Gymnastics Federation ([FIG], 2022) are elements listed in the list of elements of the code of punctuation with a number and a value. In the GAD, the difficulty elements are divided into groups: group A, elements on the ground; group B, aerial elements; group C, foot elements. These in turn are subdivided into families.

Their execution is encouraged in the development of determining capacities that allow their practice: explosive force, flexibility, resistance to force, balance and spatial orientation (Abreu, 2019). These considerations must be taken into account in the training process to be able to direct the actions or tasks to be developed according to the purpose of the coach according to the technical regulations for the execution of the elements of difficulty.

The investigation is developed from deficiencies detected in the National University Competition of GAD, Camagüey 2017, regarding the execution of the elements of difficulty.

In the event, a significant number of errors were detected in the execution of these movements. Subsequently, in exchange with the coaches and in a documentary review on the teaching of the elements of difficulty in this sport, it was identified that the GAD bases the teaching of the elements of difficulty on related elements of Rhythmic Gymnastics and Artistic Gymnastics. The standards established by the international punctuation codes of these disciplines and related methodologies come from other specialties such as dance, ballet and circus.

Authors like Car (2020); Navarro (2006); Navarro (2008); Vasconcelos (2009); Bello & Ortiz (2012); Martell (2014); Sanchez (2014); Car (2017); Navarro et al. (2017); Gonzalez (2020); Perez (2021); Rodríguez (2021) and Abreu et al. (2022), have conducted research on the teaching of some elements of difficulty in the GAD. Even so, there are other elements of difficulty that are typical of this sport of which, as far as the authors have been able to investigate, there are no declared forms for their teaching; identifying as problematic that: The ways of teaching the

elements of difficulty extracted from the FIG sports and other bibliographies, do not satisfy the technical requirements of the teaching of these elements, in the Cuban university context. Then the objective is outlined: to elaborate a methodological model for the teaching of the elements of difficulty of the GAD for the Cuban university teams.

Sample and Methodology

The research was developed under a materialist dialectical general methodological approach. Theoretical and empirical research methods were used, which, suitably combined, made it possible to establish criteria, judgments and assessments that allowed conclusions to be reached to derive compliance with the objective.

Among the methods and techniques used to troubleshoot and resolve the problem are:

- The historical-logical: that facilitated the determination of the historical background and those related to the teaching of the elements of difficulty in gymnastics.
- The synthetic analytical method: allowed from the data obtained both theoretically and empirically, to determine the main conflicts in the use of the elements of difficulty in university athletes, participants in the national university competition of GAD, Camagüey 2017.
- The systemic-structural approach: served to characterize the phenomenon and the relationship between its parts.
- The modeling method: it was used in the elaboration of the model for the construction of its content and the methodological orientations for its application.

At the empirical level it was used:

- Structured observation: to know reality through direct perception of the object and phenomenon in its natural conditions.
- The interview: it was applied to the participating coaches in the national university championship. Its objective was to know the criteria of the teachers in relation to the teaching of the elements of difficulty in the GAD.

- The documentary review: it was used to corroborate the results of the interview with the coaches.
- The statistical-mathematical method; is expressed through the empirical frequency distribution, to subsequently, through analysis and synthesis as a theoretical method, develop the model for teaching high-value elements in GAD.

Results

The solution: A model for teaching the elements of difficulty in Aerobic Sports Gymnastics

For the elaboration of the methodological model, the criteria of Jackson (2011) are assumed, who declares that a model requires an objective, indicators that describe the content and guidelines for its application. It also expresses that the model is determined by the previous experience of the teacher, his own conceptions, the relationship between the teaching objectives, the characteristics of the student and the content.

Another quality that distinguishes the methodological model for teaching the elements of difficulty in the GAD is its open and participative nature, since it is developed through the selection of tasks through which the coach conducts the learning and the athlete is able to guide your own knowledge.

***Objective*:** To teach the elements of difficulty in the GAD.

Indicators of description of the exercises for the teaching of the elements of difficulty

1) Those that allow deducing the types of perception involved.

Type of support: upper and lower support.

Forms of interaction with support (competence tapestry): supports.

Main characteristics of the performance environment or competition area.

Dimensions:

- Shape of the competition region.
- Boundary characteristics: surface, color, texture, etc.
- Relevance of the different areas of the region with respect to its limits.

- Mechanical properties of the competition soil.
- Forms of interaction between partners: supports, grips.

a) Time interval: Execution time of the action.

b) Levels of execution of the actions: on the ground, surface and air.

c) Types of changes generated by the action.

- posture: with change of posture or postures maintained with turns or landings.
- position: offset.
- orientation: rotation of the body.

a) Rhythm of execution of actions: frequency and intensity of sound stimuli.

2) Those that serve to infer the quality of the developed motor program.

a) Characteristics of the preparatory actions:

- Interaction
- Link
- Transition
- Element of difficulty
- Movement pattern
- Charged

b) Characteristics of subsequent actions:

- posture quality
- body orientation
- body position
- location in a formation

c) Quantity of shares in composition of the element.

d) Multilateral nature of the action (corporeal region used to carry out the action).

- Upper and lower limbs.

- Left and right hemibody.

e) Form of carrying out the action:

- Spatial structure.
- Temporary structure.

f) Quality of carrying out the action: yes/no (feedback from the teacher or mirror)

3) Those that allow inferring the degree of development of the musculoskeletal system (SOM) for the satisfactory execution of the motor program

a) By the degree of correspondence between the characteristics of the action and the requirements necessary to satisfy it.

b) By the degree of approximation to the ideal pattern of carrying out the action.

- Way of carrying out the action.

c) By the degree of correspondence between the motor program and the variations of the somatic, cognitive and environmental characteristics. By the way in which the valuation of the action is carried out.

- Starting note Artistic
- Execution and difficulty
- Deduction

Methods of obtaining the data of the indicators, skills involved and assessment

Sensory-perceptual specialization

a) Data collection methods: observation.
b) Perceptions involved: somatosensory (touch and proprioception).
c) Data collection methods: observation.
d) Perceptions involved: somatosensory (touch and proprioception).
e) Data collection methods: observation.
f) Perceptions involved: visual (shape, color, and depth), somatosensory (touch)
g) Data collection methods: observation.

h) Perceptions involved: somatosensory (touch and proprioception).

i) Data collection methods: observation.

j) Perceptions involved: temporary.

k) Data collection methods: observation.

l) Perceptions involved: visual and somatosensory.

m) Data collection methods: observation.

n) Perceptions involved: somatosensory (proprioception) and vestibular (linear and angular movement).

o) Data collection methods: observation.

p) Perceptions involved: auditory.

Quality of the developed motor program

Skills involved:

- quality of thought.
- flexibility of thought
- coordinate the flow of attention, complexity of the motor program (Sastre & Viana, 2016).
- plan ordered sequences of segmented, ipsilateral and bilateral movements
- identify a similar action when performed by another subject, select a sequence of memorized movements, carry out a mental rehearsal of a sequence of movements, program the magnitude and direction of the angular displacement of the biokinematic pairs, program the magnitude of the muscular action (force) (Navarro, 2017).
- self-assessment (García et al., 2010).

1. Quality of motor program execution

a) Self-assessment criteria:

- minimums for the execution of the difficulty element.
- Methodological guidelines for teaching the elements of difficulty in GAD

- That allow to influence the level of sensory-perceptive specialization

The teaching and improvement of sensory-perceptive skills is determined by the characteristics of the stimuli that athletes must process. These allow the situation to be identified, without which it is impossible to formulate the problem to be solved.

For the teaching of a new element of difficulty, the flow of presentation of the stimuli must be limited by type of receptor and sensory modality. The complexity progressively increases through the integration and nature of the stimuli presented, highlighting their true relevance (at the time of presentation) in later moments of teaching. At the beginning, the successful execution is not the goal, but the gymnast shows through the description of the element, that he has achieved a satisfactory identification of the execution scenario; namely, that he was correct in identifying the situation.

The identification of musical times related to the temporal structure of the element of difficulty selected for teaching should be oriented. Spatial representations from musical time are used.

The specialization of sensory-perceptive abilities is achieved with the repetition method. The intensity and frequency of the sound stimuli vary, the relevance of the limits of space and the properties of the contact surface, changing the spatial orientation of the body.

That allow influence on the training and development of basic skills and abilities

The most important basic intellectual skill is music appreciation. The teaching of elements of difficulty is ultimately associated with the expression of emotions set by the music, regardless of the group to which these elements belong (jumps, balance-flexibility, strength). During the teaching of the element of difficulty, musical genres on a melodic and rhythmic basis should be gradually introduced, despite the fact that the latter is the one used for the interpretation of the choreography.

The differentiation of musical genres, plots associated with music and forms of relationship with other genres of the same and different family, can guide the specialization of this intellectual ability.

The formation of skills, knowledge and habits are the support of information processing to obtain motor action programs capable of satisfying the cognitive needs of gymnasts. The teaching of solution algorithms is achieved:

a) Orienting the performance of actions under continuously increasing demand conditions, determined by the progressive increase in the degree of complexity of the exercises on the one hand and difficulty on the other, regulated by:

- The number of actions in task composition
- Variation of posture, position and orientation of the body
- The intensity of performance of the action conditioned by the music
- Execution space limitation
- The temporal relationship with other actions in composition of the routine conditioned by musical time
- The use of link elements for integration with preceding and consequent actions
- The use of transitions to and from the difficulty element being taught

b) With the use of exercises and other aids for the development of the SOM

a. Exercises that demand the activation of the same energy obtaining system.

b. Exercises involving the kinematic chains involved in similar synergistic conditions.

c. Asymmetric exercises where the sequence of actions is carried out using both sides of the body.

d. Exercises where the volume of the task determines the assimilation of the element of difficulty based on the number of repetitions necessary to assimilate it satisfactorily.

That allow to influence the quality of the motor program

Even at the highest levels of sporting mastery, the main mechanism for assessing the actions carried out by the gymnast comes from outside (coach, judge, spectator). However, no external evaluation can be assimilated, corrected and

reprogrammed without the subjective assessment of the execution of the motor action program (self-assessment). In the teaching process, the following guidelines can be considered for the gymnast to assess the quality of execution of the motor program:

- Establish the relationship between the musical scheme (with the use of pulses and accents) and the phases into which the element can be broken down for teaching purposes.
- Establish anatomical references that guide the breadth and scope in the realization of the element of difficulty in phases.
- Establish spatial references within the competitive arena (mat) for body position and position changes (formations) within the competition limits.
- Establish spatial references outside the competition limits to guide the relationship between the visual map and the orientation of the body.

The model is characterized by its flexibility. It is a valid proposal not only for teaching the elements of difficulty, but also for teaching any other element that makes up the competition routine.

Discussion

Based on the results obtained, it is assumed that the proposed model allows the teaching of the elements of difficulty in this sport based on the level of sensory-perceptive specialization of the athlete. This enables the athlete's assessment of the knowledge learned.

The model favors learning from the teaching of the elements of difficulty with a methodological nature, since it represents the internal relationship of the components and subcomponents and encourages guidance on how to intervene in practice to transform it. In it, the logical sequence of teaching is ordered as a determining element to specify in practice the teaching of the elements of difficulty. Hence, two starting premises are accepted:

a) That the technical action is made up of three consecutive stages: perception of the situation, elaboration of possible responses to the situations raised and execution of those actions that are intended to resolve the situation in question (Amaral, 2013)

b) That due to the way in which the actions in the GAD are made valid, it is a sport with a technical purpose (Copello, 2001).

Then the exercise description indicators for teaching the elements of difficulty that make up this sport can be classified according to these criteria into the following three groups (González, 2008):

- those that allow inferring the types of perception involved and their degree of specialization
- those that serve to infer the quality of the developed motor program
- those that allow inferring the degree of development of the SOM for the satisfactory execution of the motor program.

Conclusions

1. Criteria were declared in the elaboration of the methodological model for the teaching of high value elements in the GAD, according to the objective, the indicators that describe the content and the orientations for its application.
2. A total of 18 indicators classified into 3 groups were elaborated; also describing the methods for obtaining the data. These identified the minimum executive and operational skills necessary for the development of the motor program, and inferred the gymnast's self-assessment criteria.
3. The set of methodological guidelines for teaching high-value difficult elements involves 3 classificatory groups, described in the indicators for the development of the methodology.

Bibliographic references

Abreu, A. (2019). Indicadores biomecánicos para la enseñanza del elemento de dificultad Helicóptero a Wenson en Gimnasia Aeróbica Deportiva. *Acción, 15*. https://accion.uccfd.cu/index.php/accion/article/view/52

Abreu-Arranz, A.; González-Rosellol, D. y Ramos-Quian, Y. (2022). Estudio de la ejecución del straddle jump en la gimnasia aeróbica deportiva universitaria. *Acción, 18,* 1-5. *http://accion.uccfd.cu/index.php/accion/article/view/212/690*

Amaral, G. (2013) The functional organization of perception and movement. In E. Kandel; J. Schwartz; T. Jessell; S. Siegelbaum & A. Hudspeth (Eds.), *Principles of neural science* (5th ed.). McGraw-Hill. https://neurology.mhmedical.com/content.aspx?bookid=1049&sectionid=59138139

Bello, A. y Ortiz, H. (2012) *Multimedia para la enseñanza de elementos técnicos en el aerobio deportivo de la provincia de Camagüey.*

Carro, R. (2017). *Metodología para el proceso de enseñanza aprendizaje de la rutina en la Gimnasia Aerobia Deportiva* [Tesis Doctoral, Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo"].

Carro-Asen, R. (2020). Acciones metodológicas para el montaje de la rutina en la Gimnasia Aerobia Deportiva. *Mundo Fesc, 10* (s1), 14-26. file:///C:/Users/arrancada/Downloads/Dialnet-AccionesMetodologicasParaElMontajeDeLaRutinaEnLaGi-7490158.pdf

Copello, M. (2001) *Diseño Didáctico para la Formación del Judoka a Partir de la Estructura de la Técnica y los Elementos Básicos* [Tesis Doctoral, Instituto Superior de Cultura Física "Manuel Fajardo"].

García-Molina, A.; Tirapu-Ustárroz, J.; Luna-Lario, P.; Ibáñez, J., & Duque, P. (2010). ¿Son lo mismo inteligencia y funciones ejecutivas? *Neurol, 50*, 738-746. file:///C:/Users/arrancada/Downloads/InteligenciayFFEE GarciaTirapuLunaIbanezyDuque2010.pdf.pdf

González, D. (2020) *Estudio de la ejecución del elemento Straddle jump en el atleta masculino de gimnasia aeróbica deportiva de la UCCFD "Manuel Fajardo".* Universidad de las ciencias de la Cultura Física y el Deporte "Manuel Fajardo".

González-Estrada, J. A. (2008). *Sistema de orientaciones metodológicas para optimizar el desempeño táctico de los competidores de Judo* [Tesis de maestría, Instituto Superior de Cultura Física "Manuel Fajardo"].

International Gymnastics Federation. (2020) *Puntuation code 2021–2024 ed. s. l. Technical comote of the gymnastics aerobic of FIG.* https://www.gymnastics.sport

Jackson, L. T. (2011) *Methodological models of teaching. I design and funsionamient.* www.redalyc.org

Martell, R. (2014) *Pasos metodológicos para la enseñanza del elemento técnico L support con medio giro* [Tesis Licenciatura, Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo"].

Navarro, D. (2006) *Metodología para la enseñanza de la Gimnasia Aerobia aerobia deportiva escolar. Depor5tes.* https://isbn.cloud/en/9789597133544/metodologia-para-la-ensenanza-de-la-gimnasia-aerobia-deportiva-escolar/

Navarro, D. (2008) *Propuesta de una metodología para el trabajo de la Gimnasia Aerobia en el II ciclo de la enseñanza primaria.* Deporte.

Navarro, H. (2017). *Las habilidades operacionales como componentes del estado cognitivo de pacientes con enfermedades de sistema nervioso* [Tesis de doctorado, Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo"].

Navarro, L.; Carballosa, Z. & Monzón, H. (2017). Propuesta de ejercicios para mejorar los elementos de dificultad de la fuerza estática en las alumnas de la Gimnasia Aeróbica Deportiva. *Universidad y Sociedad, 9*(2), 267-270. https://rus.ucf.edu.cu/index.php/rus/article/view/577/640

Pérez, D. (2021) *La biomecánica en la enseñanza y corrección de errores de los elementos técnicos de la GAD*. Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo".

Rodríguez, M. (2021) *La preparación física en la GAD.* Universidad de Ciencias de la Cultura Física y el Deporte "Manuel Fajardo".

Sánchez, L. (2014). *Giro ilusión a split vertical: pasos metodológicos para su enseñanza* [Tesis de Licenciatura, Universidad de ciencias de la cultura física y el deporte "Manuel Fajardo"].

Sastre-Riba, S. & Viana-Sáenz, L. (2016). Funciones ejecutivas y alta capacidad intelectual. *Neurol, 62,* 65-71. http://altascapacidadesrioja.com/wp-content/uploads/2016/11/Funciones-ejecutivas-y-alta-capacidad-intelectual-2016-1.pdf

Valdés, T. (2010). *Nuevo modelo metodológico para el diseño del proceso de entrenamiento de los competidores de Gimnasia Aerobia Deportiva* [Tesis de Maestría, Universidad de Ciencias de la Cultura Física y el Deporte “Manuel Fajardo”].

Vasconcelos, O. (2009) *Programa de Gimnasia Musical Aerobia en la modalidad de tabla para la comunidad infantil del nivel primario.* Universidad de ciencias De la Cultura Física y el Deporte.

Conflictos de intereses

Los autores declaran que no existen conflictos de intereses

Contribución de autoría

Anisleidy Abreu Arranz: conceptualización, curación de datos, análisis formal, investigación, redacción y estilo

Dailyn González Rosellol: curación de datos, análisis formal, investigación, metodología, redacción-borrador original

Yusimil Ramos Quian: análisis formal, supervisión, revisión y edición