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Modelling the training of the Clinical Bioanalysis technologist in the technological process UMELISA PSA

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ABSTRACT

Introduction: The modeling of a training proposal provides abstraction through the representation of its components. Applying this scientific method facilitates understanding the current situation of Clinical Bioanalysis technologists in executing the UMELISA PSA technological procedure. **Objective:** To model a training proposal that contributes to improving the preparation of Clinical Bioanalysis technologists for the execution of the UMELISA PSA technological procedure in the Clinical Laboratory services of the Diez de Octubre municipality. **Method:** A documentary analysis was conducted on 39 bibliographic references located in the Scielo Cuba scientific library, filtered by subject. The selection was based on the application of a free-form query using Boolean operators and keywords. **Results:** General and specific components supporting the training proposal were modeled. Likewise, essential relationships between them were determined, enabling both external and internal dynamics to improve the execution of the UMELISA PSA technological procedure. A theoretical framework is provided, expressed in a model with hierarchical, subordinate, and coordinated relationships within the training proposal. The internal dynamics of the stages are characterized as integrative, flexible, didactic, and contextualized to the identified situation. **Conclusions:** The training of the Clinical Bioanalysis technologist was modeled to improve the execution of the UMELISA PSA technological procedure in the Clinical Laboratory services of the Diez de Octubre municipality.

Keywords: Modeling; Training; Technologist; Clinical Bioanalysis; Technological Procedure

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Modeling the training of Clinical Bioanalysis technologists in the UMELISA PSA technological procedure

RESUMEN

***Introducción**: la modelación de una propuesta de capacitación aporta la abstracción a través de la representación de los componentes. La aplicación de este método científico facilita entender la situación actual de los tecnólogos de Bioanálisis Clínico para la ejecución del proceder tecnológico UMELISA PSA. **Objetivo**: modelar una propuesta de capacitación que contribuya al mejoramiento de la preparación de los tecnólogos de Bioanálisis Clínico para la ejecución del proceder tecnológico UMELISA PSA en los servicios de Laboratorio Clínico del municipio Diez de Octubre. **Método**: se realizó el análisis documental de 39 referentes bibliográficos ubicados en la biblioteca científica Scielo Cuba, filtrándose por materia. La selección se basó en la aplicación de un formulario libre con los operadores booleanos y palabras claves. **Resultados**: se modelan los componentes generales y específicos que sustentan la propuesta de capacitación. Del mismo modo, se determinan las relaciones esenciales entre ellos que permiten la dinámica externa e interna para el mejoramiento de la ejecución del proceder tecnológico UMELISA PSA. Se brinda un referente teórico expresado en un modelo con relaciones de jerarquización, subordinación y coordinación de la propuesta de capacitación. La dinámica interna de las etapas tiene características: integradora, flexible, didáctica y contextualizada a la situación identificada. **Conclusiones**: se modeló la capacitación del tecnólogo de bioanálisis clínico con el fin de lograr el mejoramiento en la realización del proceder tecnológico UMELISA PSA en los servicios de Laboratorio Clínico del municipio Diez de Octubre.*

***Palabras clave**: Modelación; Capacitación; Tecnólogo; Bioanálisis Clínico; Proceder tecnológico*

Modélisation de la formation du technologue en Bioanalyse Clinique dans la procédure technologique UMELISA PSA

RÉSUME

***Introduction:** La modélisation d'une proposition de formation apporte une abstraction à travers la représentation de ses composants. L'application de cette méthode scientifique facilite la compréhension de la situation actuelle des technologues en bioanalyse clinique dans l'exécution de la procédure technologique UMELISA PSA. **Objectif:** Modéliser une proposition de formation qui contribue à l'amélioration de la préparation des technologues en bioanalyse clinique pour l'exécution de la procédure technologique UMELISA PSA dans les services de laboratoire clinique de la municipalité de Diez de Octubre. **Méthode:** Une analyse documentaire a été réalisée sur 39 références bibliographiques situées dans la bibliothèque scientifique Scielo Cuba, filtrées par matière. La sélection s'est basée sur l'application d'un formulaire libre avec des opérateurs booléens et des mots-clés. **Résultats:** Les composants généraux et spécifiques soutenant la proposition de formation ont été modélisés. De même, les relations essentielles entre eux ont été déterminées, permettant une dynamique externe et interne pour améliorer l'exécution de la procédure technologique UMELISA PSA. Un cadre théorique est proposé, exprimé dans un modèle avec des relations de hiérarchisation, de subordination et de coordination de la proposition de formation. La dynamique interne des étapes présente des caractéristiques intégratrices, flexibles, didactiques et contextualisées à la situation identifiée. **Conclusions:** La formation du technologue en bioanalyse clinique a été modélisée afin d'améliorer la réalisation de*

la procédure technologique UMELISA PSA dans les services de laboratoire clinique de la municipalité de Diez de Octubre.

Mots-clés: *Modélisation; Formation; Technologue; Bioanalyse clinique; Procédure technologique*

Modelagem da capacitação do tecnólogo em Bioanálise Clínica no procedimento tecnológico UMELISA PSA

RÉSUME

Introdução: *A modelagem de uma proposta de capacitação proporciona abstração por meio da representação dos seus componentes. A aplicação deste método científico facilita a compreensão da situação atual dos tecnólogos de Bioanálise Clínica na execução do procedimento tecnológico UMELISA PSA.* ***Objetivo:*** *Modelar uma proposta de capacitação que contribua para a melhoria da preparação dos tecnólogos de Bioanálise Clínica na execução do procedimento tecnológico UMELISA PSA nos serviços de Laboratório Clínico do município Diez de Octubre.* ***Método:*** *Foi realizada uma análise documental de 39 referências bibliográficas localizadas na biblioteca científica Scielo Cuba, filtradas por matéria. A seleção foi baseada na aplicação de um formulário livre com operadores booleanos e palavras-chave.* ***Resultados:*** *Foram modelados os componentes gerais e específicos que sustentam a proposta de capacitação. Da mesma forma, foram determinadas as relações essenciais entre eles que permitem a dinâmica externa e interna para a melhoria da execução do procedimento tecnológico UMELISA PSA. É fornecido um referencial teórico expresso em um modelo com relações de hierarquização, subordinação e coordenação da proposta de capacitação. A dinâmica interna das etapas apresenta características integradoras, flexíveis, didáticas e contextualizadas à situação identificada.* ***Conclusões:*** *Foi modelada a capacitação do tecnólogo de bioanálise clínica com o objetivo de melhorar a realização do procedimento tecnológico UMELISA PSA nos serviços de Laboratório Clínico do município Diez de Octubre.*

Palavras-chave: *Modelagem; Capacitação; Tecnólogo; Bioanálise Clínica; Procedimento tecnológico*

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INTRODUCTION

In Cuba, According to the health statistics yearbook, prostate cancer is the second leading cause of death among men.1 This situation establishes a social mandate for multidisciplinary health teams. For this reason, it is necessary to contribute to minimizing the mortality rates of the disease through the fulfillment of the healthcare function. Savón2 argues that early diagnosis is crucial in the progression of the disease, and that prostate antigen facilitates diagnosis and allows for timely treatment.

In this context, clinical bioanalysis technicians working in primary health care (PHC) clinical laboratories perform a healthcare function. This health professional is responsible for handling samples obtained from the human body, leading to the detection of physiological and morphological alterations. In particular, they perform the UMELISA PSA technological procedure for measuring prostate-specific antigen (PSA) levels.

However, the initial diagnosis at an earlier stage of this investigation identified that of the 23 clinical bioanalysis technologists working in the APS Clinical Laboratory services in the municipality of Diez de Octubre, 19 (83%) expressed insufficient preparation for performing the UMELISA PSA technological procedure. This is despite the fact that two pieces of biomedical technology, the Ultra microanalytic System (SUMA), are installed in the municipality.

Biomedical technology is considered a key element in obtaining PSA levels. In this regard, Parra3 states that clinical bioanalysis in the biotechnology era presents new perspectives and challenges. Herrera et al.4 show the clinical-epidemiological characterization of prostate cancer in the population of the North Florida Polyclinic, Cuba, based on PSA results, digital rectal examination, and diagnostic ultrasound. Cepero et al.5 analyze it to determine morbidity rates for prostate cancer in Villa Clara, Cuba.

The analysis of the above considerations highlights the importance of improving the training of clinical bioanalysis technologists to ensure the quality of the UMELISA PSA technological procedure. Adequate training provides services that meet nationally established standards. Training is seen as the means by which they acquire essential knowledge and transform the level of knowledge that underpins the development of specific skills related to this technological procedure

Hence, the authors' purpose is to answer the question: What training proposal contributes to improving the preparation of clinical bioanalysis technologists working in the clinical laboratory services of the Diez de Octubre municipality for the implementation of the UMELISA PSA technological procedure? The commitment is expressed with the objective: to model a training proposal that contributes to the improvement of the preparation of Clinical Bioanalysis technologists for the execution of the technological proceeding UMELISA PSA in the services of Clinical Laboratory.

METHOD

A bibliographic review was carried out to search for scientific information in the Scielo Cuba electronic library; It is part of the Scielo Network of Ibero-America. The selection was based on the application of a free form with the Boolean operators (AND, OR) and keywords. Additionally, the all-word option (AND) was applied and selection (OR) was sometimes restricted.

The collection of 39 theoretical references was carried out with the criterion of keywords: training, clinical bioanalysis, technological procedure, UMELISA PSA. It was classified on the basis that 80% is from 2021 to 2025 and 20% provides background, evolution and theory related to the object of research and field of action.

We used scientific methods of the theoretical level as analytical - synthetic for the analysis of research results, as well as proposed theories. The induction - deduction method facilitated interpretation for taking a position. The systematization made it possible to group, compare and establish points of agreement or discrepancy between the results.

The systemic - structural - functional approach was applied to determine the dynamics of the proposal, as well as the levels of hierarchy, subordination and coordination of general and specific components. The modelling method made it possible to represent the information in an abstract way.

RESULTS

The authors conclude that training in a clinical laboratory setting allows for improved preparation. Updating knowledge will support the development of general and specific skills for performing the

UMELISA PSA technological procedure. This will ensure the accuracy, safety, and efficiency of the results obtained. The selection of training content should be aimed at updating the following areas:

1. Technical and scientific knowledge for the UMELISA PSA trial
2. Knowledge of SUMA equipment and technology
3. Standards and regulations
4. Sample handling and processing
5. Protocol-specific procedures
6. Registration and report

It is also recognized, from an integrative position, that training improves teamwork by sharing knowledge and analyzing the results. Likewise, effective communication with other members of the multidisciplinary team, with patients and families allows the development of assertiveness and critical judgment of the health problem. Furthermore, with the use of computer systems and clinical laboratory data management software, it creates skills that support the execution of the technological procedure.

Based on this analysis, it is understood the training *of the Clinical Bioanalysis technologist for the execution of the UMELISA PSA technological procedure in the Clinical Laboratory services of the Diez de Octubre municipality such as: the process that integrates the stages of planning, foundation and execution of teaching – learning of the proposed content system. Based on the relationships of hierarchy, coordination and subordination of all external and internal components. With flexible dynamics and integrative characteristics that facilitate the improvement of preparation to raise the level of knowledge in accordance with quality standards.*

The first stage of the training proposal is the **planning,** that prioritizes the model by establishing the relationship: problematic situation - contradiction - scientific problem - objective of the research. The problematic situation was identified through empirical knowledge of the current problem. To solve it from science, the contradiction involved in determining the scientific problem and the commitment expressed in the general objective is expressed

The second stage is the **foundation** of the relationship of subordination between the components: type of training activity – fundamentals – general objectives – knowledge system – thematic plan – forms of teaching organization (FOE). Each component provides the elements to the next in order to process the content to achieve the level of assimilation planned in the activity.

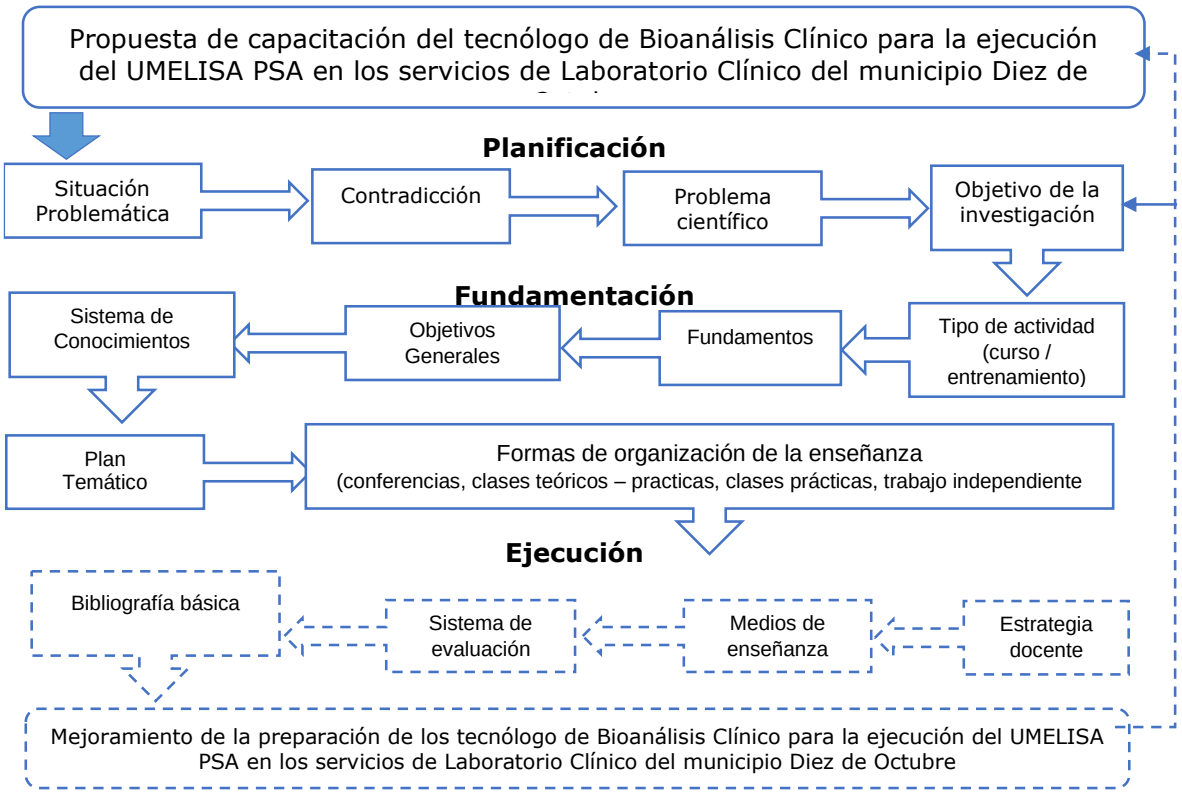
In the third stage, the **execution,** it is where the components are coordinated with a flexible nature supported by the teaching strategy – teaching aids – evaluation system – basic bibliography. These are elements that teachers adjust according to the FOE and the context where they carry out the activity. Another important aspect is evaluation; The criterion of frequent, partial and final evaluations provides feedback that allows assessing the response to the identified problematic situation. (Figure 1)

The modeling of the proposal is offered based on the field of action to be transformed; representing the characteristics of the phenomenon being studied. It is done in a similar way to reality; since in each of the proposed stages the interacting components are represented. The use of shapes and lines signifies the authors' intention, inducing how the training process takes place

The interrelationships represent the external and internal dynamics of each of the components, in addition to the significance of the influences. They represent how these relationships impact preparation; observing the functioning of the proposal in the theoretical - practical conditions of the teaching – learning process. The flow of the proposal is conducive to feedback to understand the importance of the social assignment to which the response is given.

The proposal enriches the theory by facilitating the understanding of the training process; This is achieved with the simplified reproduction of new relationships and qualities, which facilitate the transformation of the preparation of the Clinical Bioanalysis technologist, for the execution of the UMELISA PSA technological procedure. It should be noted that each of the components has an internal dynamic that allows it to fulfill the assigned function within the system

Figure 1. Modeling of the training proposal



Based on the above considerations, the following characteristics of the training proposal are determined that facilitate preparation n of Clinical Bioanalysis technologists for the execution of the technological procedure UMELISA PSA:

- ✓ Integrative: general and specific content that will lead to better preparation as part of the multidisciplinary health team; given the capacity acquired in the training. Rapid technological decision-making to provide quality services in accordance with the health-disease process.

- ✓ Didactics: by linking the components of the teaching process - learning to introduce the contents in logical order which will underpin technological decision-making; by implementing the technological procedure through the transfer of scientific and practical knowledge of the specialty.

- ✓ Flexible: by adapting to social and work conditions, taking into account clinical and epidemiological methods that will contribute to the correct execution of the technological procedure. From a favorable environment that allows the Clinical Bioanalysis Technologist to communicate adequately with patients, family members, and the multidisciplinary team to respond to the health problem.

- ✓ Inclusive: from a social and humanistic perspective, by helping to respond to the requirements of the Cancer Care Program in primary health care. This ensures proper care without exclusion based on race, origin, religion, creed, disability, or chronic communicable or non-communicable diseases.

- ✓ Contextualized: by allowing the acquisition of knowledge related to the technological procedure from the real context where it is carried out. With a bidirectional relationship that contributes to the correct management of biomedical technologies in obtaining and interpreting the UMELISA PSA in the Diez de Octubre municipality, in order to provide quality services.

- ✓ Personalize: by responding to identified learning needs in order to provide quality healthcare services and contribute to the early detection, diagnosis, and monitoring of prostate cancer.

From the characteristics explained, it is determined that the integrator is the rector. It is assumed that integrative training offers benefits that contribute to individual, collective and social development. With improved preparation, different skills are strengthened, promoting a broader and more complete profile. Group activities provide motivation and commitment among team members, with a holistic and participatory approach.

The integration of knowledge and skills facilitates more critical and creative thinking. The ability to solve problems that may arise in the work context is improved. This leads participants to develop a broader vision to adapt to changes and new situations in the fulfillment of the care function. Elements that underpin the increase in efficiency and quality of the work performed. The culture of constant improvement and updating of knowledge and skills is also promoted

DISCUSSION

Burguet [6] it states that the training and permanent development of the professional skills of microbiology laboratory specialists is conducive to improving professional performance. Related to this, Govin and others [7] they demonstrate the importance of staff training, compliance with good practices and biosafety measures when working with samples of infectious potential. Molina et al [8] they incorporated new activities related to risk-based thinking for staff training.

Through the systematization carried out, it was identified that this scientific method has been applied in several sciences to express the relationships of the different levels and components in correspondence with the reality to be transformed. From Pedagogical Sciences, Mora and others 9 they represented the theoretical-methodological proposal for the training in educational robotics of the Computer Science teacher. Mendoza 10 developed the conception of the training of English teachers to address learning difficulties

Likewise, from other sciences, García and collaborators [11] they present a preparation model for teachers at the Tourism Training Center in Cuba. Hernandez et al [12] they represent the virtualization process of training at the University of Physical Culture and Sports Sciences. Fernandez et al [13] they provide a participatory management model for the Artemisa Faculty of Medical Sciences

Based on the aforementioned theoretical frameworks, it follows that modeling is a theoretical method that expresses the importance of relationships and components. It allows for specific deductions to be made from the proposal, which will be applied later to verify its validity as a possible solution to the scientific problem. The elements previously stated allow for an abstract understanding of the proposal's dynamics, while still highlighting its relevance to reality.

According to Riestra et al., [14] training, understood as the set of didactic or teaching activities, improves work capabilities and aims to expand the knowledge, skills, or aptitudes of human resources, leading to improvement in any organizational process. Santes and collaborators [15] present the design of a training strategy in virtual learning environments for science communication. They explain that the effectiveness of the actions was confirmed through continuous monitoring of the stages and evaluation of the results of training specialists in science communication. The strategy was flexible, integrative, and adapted to the specific needs of the institution's specialists.

CONCLUSIONS

The modeling of the training proposal allows us to understand, through the abstract representation of the phenomenon under study, the general and specific components, as well as the relationships established between them; all of this evidenced in integrative training, which improves technical skills, human and organizational aspects that make the work environment a more productive space.

BIBLIOGRAPHIC REFERENCES

1. Ministerio de Salud Pública. Anuario Estadístico de Salud. 2023. [Internet]. 2024 [citado 2025 Mayo 16] La Habana. Cuba. Cuadro 40. https://files.sld.cu/dne/files/2024/09/Anuario-Estad%c3%adstico-de-Salud-2023-EDICION-2024.pdf
2. Savón-Moiran L. Cáncer de próstata: actualización. Rev. inf. cient. [Internet]. 2019 Feb [citado 2025 Mayo 16]; 98(1): 117-126. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1028-99332019000100117&lng=es.
3. Parra-Vega DA. El Bioanálisis Clínico en la era de la biotecnología: Nuevas perspectivas y desafíos. Rev. Cub. Tecnol. Salud. [Internet]. 2024 [citado 21 May 2025]; 15 (3). Disponible

en: https://revtecnologia.sld.cu/index.php/tec/article/view/4356
4. Herrera-Prieto A, Alonso-Carballo J, Gómez-Gutiérrez MC, Moya-Nodarse A. Caracterización clínico-epidemiológica del cáncer de próstata en población del Policlínico Norte de Florida, Cuba. 2024 https://eventosaps.sld.cu/index.php/medfamiliarhlg2024/2024/paper/view/566/926
5. Cepero-Montalván M, Noda-Valledor MI, Farril-Hernández MTO, Fimia-Duarte R. Morbilidad por cáncer de próstata en Villa Clara, Cuba: 2016-2020. Paideia XXI [Internet]. 6 de octubre de 2023 [citado 17 de mayo de 2025]; 13(2):309-18. Disponible en: http://revistas.urp.edu.pe/index.php/Paideia/article/view/5983
6. Burguet-Lago N, Campaña-Burguet A. Propuesta de una estrategia de capacitación en bioseguridad en la Unidad Empresarial de Base Laboratorios Liorad. Rev. CENIC Cienc. Biol [Internet]. 2020 Dic [citado 2025 Jul 29]; 51 (3): 207-221. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2221-24502020000300207&lng=es.
7. Govin-Sanjudo A, Pacheco-Cruz Y, Castellanos-Pérez D, Milián-Díaz LC, Herrera-Ledesma Y, Burguet-Lago N et al. Diagnóstico molecular del SARS-CoV-2 en los Laboratorios LIORAD-AICA+: experiencia de un año de trabajo. Rev Cubana Med Trop [Internet]. 2022 Ago [citado 2025 Jul 29]; 74(2). Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0375-07602022000200016&lng=es.
8. Molina-Márquez M, Pérez-Vasallo AL, Martínez-Vasallo A, Betancourt-Bravo A, Roque-Piñeiro E. Rediseño del Sistema de Gestión de la Calidad en el Laboratorio CENLAC, basado en la norma NC ISO/IEC 17025: 2017. Rev Salud Anim. [Internet]. 2022 [citado 2025 Jul 29]; 44: Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0253-570X2022000100004&lng=es.
9. Mora-Clavel Y, Soler-Rodríguez R, Martínez-Cabrales RL. Propuesta teórico metodológica para la formación en robótica educativa del profesor de Informática. Varona [online]. 2025, n.82 [citado 2025-07-30]. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1992-82382025000100013&lng=es&nrm=iso
10. Mendoza-Zúñiga M. Concepción de la formación de profesores de inglés para atender las dificultades en el aprendizaje. Varona [online]. 2025, n.82 [citado 2025-07-30]. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1992-82382025000100011&lng=es&nrm=iso
11. García-Ramo-López, E. Modelo de preparación de los docentes del Centro de Capacitación del Turismo en Cuba. Varona [online]. 2024, n.81 [citado 2025-07-30], pp. 61-77. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1992-82382024000300061&lng=es&nrm=iso
12. Hernández-O´Farrill L, Coll-Costa, JL, Sierra-Gómez GC. Virtualización de la formación en la Universidad de Ciencias de la Cultura Física y el Deporte. Varona [online]. 2023, n.78 [citado 2025-08-12]. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1992-82382023000300016&lng=es&nrm=iso
13. Fernández-Mijares E, Rojas-Hernández Leo. Modelo de dirección participativa para la Facultad de Ciencias Médicas de Artemisa. Varona [online]. 2020, n.71 [citado 2025-07-30], pp. 35-42. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1992-82382020000200035&lng=es&nrm=iso
14. Riestra-López M, Zurita-Cruz CR, Leyva-Fuentes M. La capacitación desde un enfoque pedagógico orientada al turismo accesible e inclusivo. Varona [online]. 2024, n.80 [citado 2025-07-31]. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1992-82382024000200014&lng=es&nrm=iso
15. Santes-Corbo D, Jiménez-López Giset. Diseño de una estrategia de capacitación en entornos virtuales de aprendizaje para la divulgación científica. Serie Científica [online]. 2024, vol.17, n.11 [citado 2025-07-31], pp. 33-44. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2306-24952024001100033&lng=es&nrm=iso

Conflict of interest
The author declares that there are no conflicts of interest between them, nor with the research presented.

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