Corresponding author:

ibelos95@cecmed.cu

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Ibel Ortíz-Salatti [1]
Agencia Nacional de Regulación Sanitaria CECMED
https://orcid.org/0000-0002-5582-2613
ibelos95@cecmed.cu
Cuba

Leinen de la C. Cartaya-Benítez [2]
Agencia Nacional de Regulación Sanitaria CECMED
https://orcid.org/0000-0002-2695-5724
leidela0912@cecmed.cu
Cuba

Oscar E. Velázquez-Soto [3]
Agencia Nacional de Regulación Sanitaria CECMED
https://orcid.org/0000-0001-7149-8721
oevelazquez@cecmed.cu
Cuba

Rolando Mirot-Delgado [4]
Agencia Nacional de Regulación Sanitaria CECMED
https://orcid.org/0000-0003-0117-5243
rolando87@cecmed.cu
Cuba

Diagnosis of training needs and proposal of the course: Strengthening research skills

Diagnóstico de necesidades de capacitación y propuesta del curso: Fortalecimiento de las competencias de investigación

Diagnóstico das necessidades de formação e proposta do curso: Reforço das competências de investigação

Abstract

Introduction: research competencies are essential for the training of health personnel, particularly for educators and researchers, and can be developed through training courses. **Objective:** to diagnose the learning needs of specialists and propose a training course on research competencies that addresses the identified needs. **Method:** an exploratory-descriptive, applied, experimental, and cross-sectional study was conducted between April and July 2025 at the National Agency for Health Regulation (CECMED). Two surveys were administered via the Google Forms platform to identify participants' learning needs and the course content. **Results:** 68.42% of participants demonstrated insufficient knowledge regarding keywords and descriptors, while 93.75% showed insufficient knowledge regarding the research profile. Based on the collected data, a system of contents, skills, objectives, and topic-specific evaluations was developed. **Conclusion:** the learning needs of the participants were successfully identified, which proved useful for designing the proposed course aimed at strengthening research competencies.

Keywords: scientific communication, information retrieval, scientific researcher, educator

Resumen

Introducción: las competencias de investigación son esenciales para la formación del personal de salud, especialmente a docentes e investigadores y estas se pueden formar mediante cursos de capacitación.
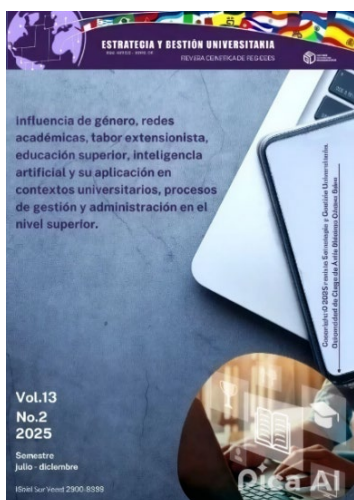
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Objetivo: diagnosticar las necesidades de aprendizaje de los especialistas y proponer un curso de capacitación sobre las competencias de investigación que dé respuesta a las necesidades encontradas. **Método:** se realizó una investigación de tipo exploratoria-descriptiva, aplicada, experimental y transversal, en el período comprendido de abril a julio del 2025 en la Agencia Nacional de Regulación Sanitaria CECMED. Se aplicaron dos encuestas a través de la plataforma Google Forms, para identificar las necesidades de aprendizaje de los participantes y los contenidos del curso. **Resultados:** el 68,42% de los participantes obtuvo un nivel insuficiente de conocimientos sobre palabras claves y descriptores; y el 93,75% de los participantes obtuvo un nivel insuficiente de conocimientos sobre el perfil de investigación. A partir de los datos arrojados se presentó el sistema de contenidos, habilidades, objetivos y evaluaciones por tema. **Conclusión:** se lograron identificar las necesidades de aprendizaje de los participantes, lo que resultó de utilidad para el diseño de la propuesta del curso de fortalecimiento de las competencias de investigación.

Palabras clave: comunicación científica, recuperación de información, Investigador científico, docente

Resumo

Introdução: as competências de pesquisa são essenciais para a formação de profissionais de saúde, especialmente docentes e pesquisadores, e podem ser desenvolvidas por meio de cursos de capacitação. **Objetivo:** diagnosticar as necessidades de aprendizagem dos especialistas e propor um curso de capacitação sobre competências de pesquisa que responda às necessidades identificadas. **Método:** foi realizada uma investigação exploratória-descritiva, aplicada, experimental e transversal, no período de abril a julho de 2025, na Agência Nacional de Regulação Sanitária (CECMED). Foram aplicados dois questionários por meio da plataforma Google Forms, com o objetivo de identificar as necessidades de aprendizagem dos participantes e os conteúdos do curso. **Resultados:** 68,42% dos participantes apresentaram nível insuficiente de conhecimento sobre palavras-chave e descritores; e 93,75% apresentaram nível insuficiente de conhecimento sobre o perfil de pesquisa. A partir dos dados obtidos, foi elaborado um sistema de conteúdos, habilidades, objetivos e avaliações por tema. **Conclusão:** as necessidades de aprendizagem dos participantes foram identificadas com êxito, o que se mostrou útil para o desenho da proposta do curso de fortalecimento das competências de pesquisa.

Palavras-chave: comunicação científica, recuperação da informação, pesquisador científico, docente

| Ibel Ortíz-Salatti | Leinen de la C. Cartaya-Benítez | Oscar E. Velázquez-Soto | Rolando Mirot-Delgado |

Introduction

Training is nothing more than the development of competencies and skills. As indicated by Hernández-Martínez et al. (2025), it enhances productivity and competitiveness in workplace environments. However, this educational endeavor currently faces significant challenges, particularly regarding the availability and organization of healthcare personnel. According to Estrella-López et al. (2025), the primary challenge lies in cultivating practical competencies and skills such as research, communication, teamwork, and management.

Competencies refer to a professional's ability to perform a specific function based on their knowledge, skills, and values. Hernández Barbosa and García-Martínez (2025) highlight the existence of specific competencies and transversal competencies; the latter enables appropriate task execution regardless of the operational context, where research competencies are included.

Nevertheless, Zavala-Baque et al. (2025) clarify that the development of transversal competencies requires the intentional and systematic application of methods that promote reflective learning in specific contexts. It is crucial to view the educator or researcher as an active agent in their education, utilizing methodologies that encourage group participation and foster their autonomy in facing real challenges. Additionally, a multidisciplinary approach is promoted, along with the necessity of having qualified educators.

In Spain, as reported by Espinosa-Barreiro et al. (2024), several authors agree that it is essential to cultivate skills from a holistic perspective. They emphasize that teaching competency should not be reduced to disciplinary knowledge alone; rather, it necessitates continuous training that enables university educators to respond with rigor and creativity to an ever-evolving educational environment. Sánchez-Soriano (2021) discusses the necessity of research and its scientific communication, as well as how higher education faces liquidity issues in the research sphere.

Similarly, in various Latin American countries, according to Portuondo-Sánchez and Álvarez-Rodríguez (2018), competencies in teaching, research, digital skills, and humanistic approaches should be fostered for improved professional performance. They argue that research competencies are essential for training healthcare personnel, particularly those engaged as university educators. Pupo-Ávila et al. (2025) explain that this professional training ensures the quality of medical care and holistic patient attention, as well as project management and critical problem-solving.

In Lima, Romaní-Romaní et al. (2022) proposed a plan to develop scientific research skills through the design of a curriculum that introduces research and scientific skills courses. However, they argue that these courses cannot be merely specialized; instead, they should stem from the core subject of Research Methodology, which often fails to cover content related to information retrieval and research profile management.

Research competencies, being transversal to all sciences, facilitate the intellectual and professional development of healthcare professionals. Among these research competencies, the ability to search for and retrieve information, as well as

manage research profiles, stands out. The skill to seek and recover reliable sources of information allows for the acquisition of updated and accurate bibliographical material on a topic. Research profiles are managed through digital platforms like the Open Researcher and Contributor ID (ORCID), which provides a unique identifier associated with an individual's academic, professional, and research trajectory.

In the Cuban context, researchers must be accredited with a scientific category granted by a commission upon meeting specific requirements as outlined in Resolution 171/2023, "Regulation for the Categorization of Researchers," from the Ministry of Science, Technology, and the Environment (CITMA). In this regard, science and innovation institutions outline their strategies for categorizing their researchers, with training for interested personnel and those wishing to change categories as the first step. Hence, at the National Health Regulatory Agency (CECMED), there arises a necessity to train researchers and educators concerning research competencies.

In a context of constant evolution in biomedical knowledge and information technologies, it is imperative to strengthen transversal competencies. These skills not only enhance the individual's capacity to generate, apply, and share knowledge, but also have a direct impact on the quality of teaching, institutional research, and decision-making. Moreover, in regulatory environments like CECMED, where scientific production and academic visibility are linked to categorization and professional recognition processes, ongoing training and the education of healthcare personnel are crucial for personal, institutional, and national science and innovation system development.

Therefore, the objective of this research is to diagnose the learning needs of the specialists at the center and subsequently propose a training course focused on research competencies for educators, researchers, and personnel seeking categorization.

Methods and materials

Type of research: an exploratory-descriptive research study was conducted, focusing on diagnosing and identifying problems during the period from April to July 2025. This research is applied within the context of CECMED.

Two surveys were administered to measure the following knowledge areas:

- information searching and retrieval using keywords and descriptors;
- understanding of ORCID, its potential, and its links to other academic platforms.
- The surveys were also instrumental in identifying the learning needs of the future course participants.

Studied variables:

- research category

- years of experience

- level of knowledge

- learning needs

A total experimental sample of 19 individuals was selected, based on intentional diversity criteria: all researchers are graduates with higher education degrees across various specialties, each with over one year of continuous work at CECMED. The surveys were conducted through the Google Forms platform (Survey 1: https://n9.cl/mdkzu and Survey 2: https://n9.cl/a8lkb).

Responses to six questions were tabulated, using criteria of sufficient (S) and insufficient (I). They were evaluated based on the accuracy of the respondents' answers. A response was considered sufficient if participants answered five or more questions correctly; insufficient if they marked two or fewer correctly. The survey was validated by a Committee of Experts.

In identifying the learning needs, the problem tree method was employed, a recognized tool for analyzing complex issues through causal relationships. According to González-Muñoz et al. (2023), this analytical method not only structured the visualization of the problem but also prioritized critical areas to orient the course content towards the acquisition of specific skills and knowledge to overcome these causes, based on a consensus among experts and involved stakeholders.

The construction of the problem tree was performed participatively, involving regulatory agency professionals and knowledge management specialists, which enhanced the multidimensional understanding of the phenomenon and ensured the relevance of the diagnosis, thereby guiding the curriculum design towards clear and achievable objectives.

Results and discussion

The analysis of the survey results revealed that 68.4% of participants held no research category, many of whom are currently in the process of preparation and compiling their documentation (see Table 1). Additionally, it was noted that most respondents have over five years of research experience, a positive aspect for assessing the evolution of their skills over time.

Table 1

Distribution of respondents by research category and years of experience

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Research Category	Percentage	Years of Experience in Research	Percentage
No Category	68.4%	Less than one year	29.4%
Aspiring Researcher	10.5%	1-5 years	29.4%
Associate Researcher	10.5%	Over 5 years	41.2%
Assistant Researcher	5.25%		
Senior Researcher	5.25%		

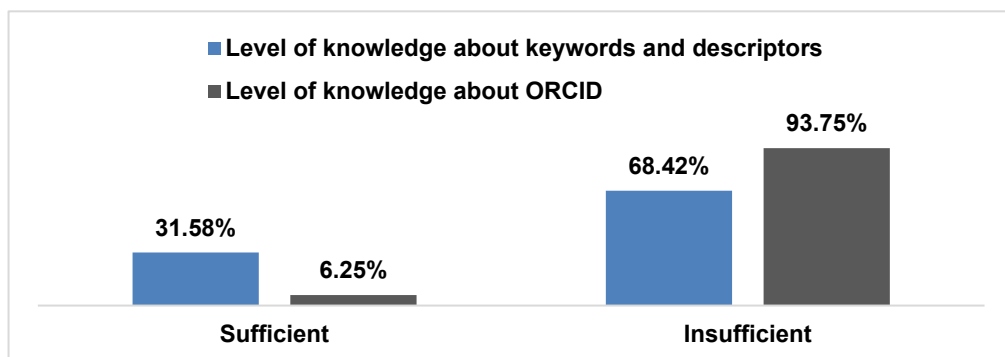Source: Authors' own elaboration.

Note. This table displays the percentage distribution among different scientific categories and levels of expertise related to research activities.

Participants were aged between 30 and 65 years, predominantly female, with only two male participants. All members (100%) are graduates with higher education degrees in various medical sciences disciplines. These data indicate a high level of research experience, with results being more representative among adult women with higher education. Future studies can analyze additional statistics.

It can be observed that 68.42% of participants demonstrated insufficient knowledge regarding keywords and descriptors, while 93.75% were assessed as insufficient in their understanding of ORCID (see Fig. 1). This highlights the necessity for these topics to be included in the graduate course.

Figure 1

*Levels of knowledge on Topics 1 and 2*

Source: Authors' own elaboration.

Note. This figure shows the levels of proficiency observed in the diagnosis, on keywords and descriptors, and on the use of ORCID.

The majority relied on search engines (36.8%) and databases (47.4%) as their primary sources. The most common search strategy was the exclusive use of keywords (63.2%), followed by a combination with descriptors (31.5%). For most participants (84.2%), identifying keywords was intuitive, while 63.2% had never used a thesaurus, and 15.8% were unaware of its definition. Regarding ORCID management, 82.4% are aware of the identifier, but 35.3% do not have an active one. The updating of ORCID accounts is poor, with 64.7% not having updated theirs and 70.6% unaware of the process to link to academic platforms (see Fig. 2).

Figure 2

Aspects evaluated by the survey: use of search engines, databases, thesaurus, keywords, descriptors, and ORCID identifier
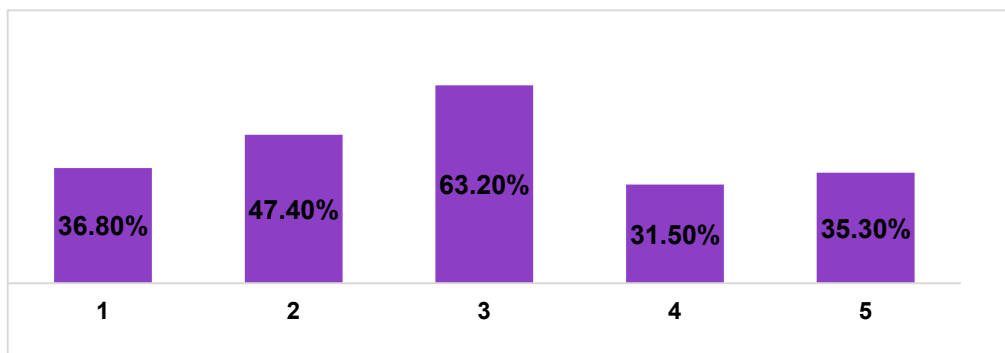
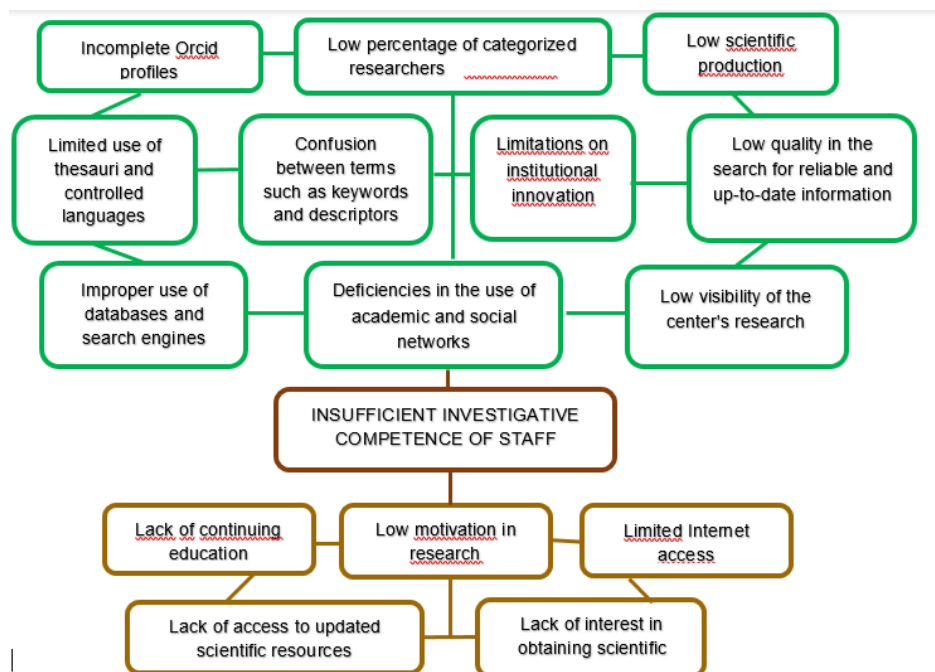Source: Authors' own elaboration.

Note. The figure shows the percentage variation among five aspects measured in diagnostic survey 2. Legend: 1. Use of search engines. 2. Database usage. 3. Not used a thesaurus. 4. Search strategy: combination with descriptors. 5. It does not have an ORCID identifier.

The Problem Tree (Fig. 3) identifies insufficient research competency among personnel as the central trunk, which limits their ability to manage and apply updated scientific knowledge. Its roots are linked to causes such as lack of ongoing training, limited access to scientific resources, technological constraints, and low motivation for research. Consequently, branches emerge reflecting low quality in information retrieval, weak scientific production, limited institutional visibility, and poor utilization of academic tools and networks, among other factors that hinder the research and educational development of the center.

Insufficient research competency among personnel is a decisive factor that hampers the center's ability to manage and apply updated scientific knowledge. Improving research competency necessitates a strategic plan that combines professional development, resources, and institutional incentives for research. An evaluation approach should include outcome measures on three fronts: staff capabilities (competencies), research products (projects and publications), and institutional processes (access to information, networks, and visibility).

Figure 3

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Problem tree "Insufficient research competency of staff"

Source: Authors' own elaboration.

Note. The figure illustrates a tree analysis, identifying five root causes that branch into ten problems stemming from the central issue.

The results of this research concerning ORCID may be attributed to the lack of mandatory requirements for this field in author registration on journal platforms, as well as ignorance regarding its importance and proper management. The identified insufficiencies are effects of inadequate training on keywords, descriptors, and ORCID, underscoring the need to design and implement a course that strengthens these competencies, which every researcher and educator should possess.

Additionally, a limited understanding of controlled vocabulary was noted, which is a negative impact in the field of Health, which has various specialized thesauri. The absence of specialized thesauri implies less precision in concept encoding, compromising the quality of bibliographic searches, standardization of terminology, interoperability of records, collaboration among staff, comparability of results between studies, and traceability of scientific evidence for clinical and educational decision-making.

From the results, three fundamental learning needs were identified, indicating the necessity to clarify the concept of keywords during the first conference of the course. One limitation that may affect CECMED researchers is

restricted Internet access, as it is limited, and their heavy workload affects the time available for browsing.

Studies such as that conducted by Contreras and Espinosa (2021) align with the findings of this research, as they demonstrated that authors only occasionally use descriptors appropriately, complicating their proper indexing and subsequent retrieval of scientific publications.

The proposed training course aimed at strengthening research competencies aligns with the current demands of scientific education. While there are educational programs that address methodological aspects of research, such as the "Diplomado en Investigación Aplicada y Clínica en Odontología" at the Pontifical Catholic University of Chile (2025), which seeks to develop skills from formulating a question to managing research projects, it does not adapt to the regulatory and educational context.

This course, targeted at dentists and health professionals, includes modules on literature review and search, and reference managers, but fails to detail the teaching of identifiers like ORCID or the strategic use of thesauri for indexing and information retrieval. The CECMED proposal differentiates itself by focusing on key tools for enhancing the visibility and impact of scientific production, while also obtaining the designation of a teaching unit from the University of Havana and the Faculty of Medical Sciences of Havana.

The relevance of research training has been highlighted by Castro-Rodríguez et al. (2025) as a favorable quality indicator in education, with opportunities that include economic benefits from projects or publications and the hiring of educators and researchers. Certainly, greater involvement of professionals in research projects generates higher economic benefits for educators, researchers, and the institution as a whole.

However, for authors like García-Trujillo et al. (2025) and Reyes-Fernández (2023), challenges persist regarding motivation and educator training concerning research teaching strategies. In this context, a course focused on scientific visibility tools could act as a catalyst for motivation, demonstrating to regulatory professionals how their work can be effectively recognized and disseminated.

The formation of research skills, according to Panizo-Bruzón et al. (2020), is a recognized need, demanding both theoretical and practical tools for solving professional problems. Nevertheless, the reviewed literature does not delve into specific training on managing a researcher's digital identity (ORCID), optimizing metadata (keywords, descriptors, thesauri), and the strategic use of academic networks to enhance visibility and impact.

Bhatt and Snehasish (2025) argue that the ORCID ID is essential in the digital research landscape, providing a consistent and interoperable means of identifying researchers. Additionally, they advocate for outreach initiatives regarding ORCID usage and institutional strategies from platforms like IRINS and DSpace. CECMED is also working on creating a research platform to make institutional results and scientific potential available to all.

The proposed course seeks to bridge the digital and cognitive gap by

providing practical knowledge that empowers researchers to navigate the scientific publication ecosystem more effectively. According to Zhaksylyk et al. (2023), researchers must adhere to the highest ethical standards, and institutions play a pivotal role in establishing an environment that supports ideals of integrity while providing guidance, instruction, and assistance to researchers.

The omission of topics like ORCID and the management of descriptors in most training programs of Health Regulatory Agencies in Latin America, such as the Diplomado from San Sebastián University in Chile (2017) or the Diploma in Regulatory Affairs in Argentina (2025), represents a limitation that seeks to be overcome.

The literature reviewed by Cruz-Pérez and Pozo-Vinueza (2020) and Rodríguez-Lora et al. (2019) underscores the need to strengthen research training, and this proposal complements these efforts by providing a practical focus on knowledge management tools essential for the modern researcher. Furthermore, Baute et al. (2022) refer to the systematization of ongoing training in research competencies as a fundamental requirement for university educators to enhance their modes of action with social responsibility; an aspect that this course explores and aims to maintain continuity to update the content according to the current context and characteristics of the students.

The graduate course is designed to accommodate varying levels of experience, ranging from beginners to those with more advanced knowledge, offering tools and resources that facilitate learning in an accessible and effective manner. The center is interested in increasing the number of categorized researchers and educators, enhancing scientific production, and ensuring progression through research categories.

The course comprises 112 hours divided according to topics: 32 hours for Topic 1, 16 hours for Topic 2, 32 hours for Topic 3, and 16 hours for Topic 4, respectively. It is designed to include a weekly in-person class (2 hours), one recovery week, and a final project submission, along with opportunities for student consultations as feedback.

The remaining hours correspond to interactions in the Virtual Classroom, where students will find lectures, bibliographic materials on the topic, supporting materials, and where they must upload their responses to exercises. The use of virtual learning environments helps reduce educator burnout (Muñoz et al., 2025).

According to Germán-Reyes et al. (2024) and Gómez-Cárdenas et al. (2024), it is essential to raise awareness among university students regarding the ethical dimension of information and communication technologies in educational contexts. Therefore, students are required to submit plagiarism-free assignments and utilize the virtual learning environment correctly.

The assessment system consists of a diagnostic or initial assessment, a formative or continuous assessment, and a final or summative assessment. The Diagnostic Assessment (Initial) will involve the application of a questionnaire aimed at identifying the baseline level of knowledge regarding research methodology, thereby redefining the focus of the graduate program according to the students' characteristics.

The Formative Assessment (Continuous) will consider active participation in classes (10%), including contributions to discussions, workshops, and critical analysis of scientific articles. Additionally, it will assess the submission of practical assignments (40%), requiring either a group or individual project for each topic (10% for each assignment). Practical exercises, according to Palacios-Liberato (2025), develop skills to design strategies, methods, or techniques that allow for the resolution of complex problems and foster institutional innovation.

Olaseni (2025) indicates that implementing Project-Based Learning in technical education presents a valuable opportunity to bridge the gap between education and the demands of the modern labor market; thus, the research project must culminate in a scientific article. Jha et al. (2025) assert that for students, monthly internal assessments and seminars, along with skill-based competency certification, are effective initiatives to enhance academic performance and enrich their knowledge, which is why a continuous formative assessment has been selected.

The Final Assessment (Summative) will evaluate the generated product (50%), which involves creating a manuscript for potential publication in a scientific journal, thus it must demonstrate originality, rigorous methodology, and applicability in the Cuban regulatory context. Following the guidelines of the Journal of Sanitary Regulation, the official scientific communication body of CECMED, will be recommended.

According to Márquez-Valdés et al. (2023), thorough evaluation of the teaching-learning process in general and, specifically, of the formation of research competencies leads to assessment, orientation, and regulation of that process. Consequently, a final satisfaction survey for the course is also designed to measure the effectiveness of the training at the center, analyzing acceptable learning levels and participant motivation (Mitchell et al., 2022).

The system of contents, skills, objectives, and evaluations per topic is visualized in Figure 4. In its development, various authors were reviewed: Guruge et al. (2021), Álvarez and Rodríguez (2025), Jesus et al. (2025), Orozco-Cazco et al. (2025), Plasencia-Urizarri and Almaguer-Mederos (2022), and Castro-Rodríguez (2021). The course will be updated annually to optimize its contents based on sociotechnical advancements in research.

Table 2

System of contents, skills, objectives, and evaluations per theme

Themes	Contents	Skills	Objectives	Evaluation
Theme 1: introduction to information searching and retrieval.	✓ Basic concepts. ✓ Main sources. ✓ Use of thesauri. ✓ Search strategies.	Develop skills to identify information needs, design effective search strategies, retrieve accurate data, evaluate source relevance, and promote ethical	Foster adaptation to digital research and continuous learning for academic-professional	Elaboration of a research protocol in health.

	✓ Veracity of documentary sources.	access and use of information.	development.	
Theme 2: importance of ORCID for scientific research.	✓ Creating and configuring an ORCID profile. ✓ Linking ORCID to academic platforms.	Manage authorship and scientific visibility through ORCID, keeping the account updated and linked, as a prerequisite for scientific publishing.	Develop and certify competencies in academic information management.	Creation and normalization of the ORCID profile.
Theme 3: key aspects for scientific communication.	✓ Identifying journals for publication. ✓ Predatory journals. ✓ Types of articles. ✓ Different bibliographic norms.	Structure academic documents rigorously (APA, Vancouver), master scientific networks, analyze copyright issues, simplify technical language for diverse audiences, and write clearly and precisely following international standards.	Promote the use of digital platforms to enhance collaboration while improving scientific communication skills.	Structure an article and advance in its development, applying the Vancouver standard for bibliographic references.
Theme 4: dissemination of academic and professional content on social media.	✓ Types of social media, algorithms, uses, and updates. ✓ Mechanisms for protecting personal data.	Leverage digital tools strategically and responsibly to enhance scientific dissemination, measuring impact through analytics.	Develop and manage profiles on academic networks to build a community of practice.	Construction of a prototype publication on a social network or the publication of a preprint.

Source: Authors' own elaboration.

Note. The table summarizes the course program.

The course covers four fundamental topics: first, it introduces information searching and retrieval, where participants learn basic concepts, sources, the use of thesauri, and search strategies, with the objective of developing skills in identifying information needs and evaluating sources. The second topic focuses on the importance of ORCID for scientific research, teaching participants how to create and

manage a profile to enhance visibility and authorship.

The third topic explores key aspects of scientific communication, including the identification of suitable journals and bibliographic standards, to rigorously structure academic documents. The fourth topic analyzes the dissemination of academic content through social media, emphasizing the responsible use of these platforms for assertive communication while ensuring the protection of personal data.

Assessment in each topic is essential for developing competencies in the academic and scientific fields, as it includes the development of specific protocols, ORCID profiles, structured articles, and publication prototypes. These activities enable students to apply their theoretical knowledge, promote systematic research, and ensure proper authorship management. Moreover, they facilitate the rigorous presentation of scientific contributions and strengthen the communication skills of university educators, researchers, and aspiring professionals.

However, this proposal does present some limitations as research. One limitation lies in the sample size, which may affect the generalizability of the results but depends on individual interest in participating in courses like the one proposed and its prioritization over other more technical courses that respond to institutional interests and the activities of center employees. Additionally, external factors may have influenced the responses to the applied surveys due to biases related to internet usage and the search for answers using artificial intelligence.

Based on the findings and the proposal presented in this article, several lines of future research can be explored. One avenue could focus on evaluating the impact of the course "Strengthening Research Competencies" once implemented, measuring indicators such as the improvement in the quality of bibliographic searches, the increase in the creation and updating of ORCID profiles, and the rise in scientific production among participants. Furthermore, it would be valuable to investigate how training in managing a researcher's digital identity influences institutional visibility and the acquisition of official scientific categories.

Conclusions

The learning needs of the participants were identified, which include insufficient use of descriptors, limited knowledge about managing ORCID, restricted access to reliable information sources, and minimal dissemination of research results, leading to low visibility for the center and its educators and researchers. The course "Strengthening Research Competencies" is proposed as a fundamental tool for developing the skills of CECMED researchers, which will also promote scientific communication and efficient knowledge management.

It is suggested that this course be updated annually to incorporate new topics in line with the socio-technical advancements in scientific research. With the implementation of this graduate course proposal, specialists and participants will be able to refine their final projects into manuscripts for submission to peer review for the Journal of Regulación Sanitaria (RSS) and other specialized journals, addressing the identified issue of low scientific productivity at CECMED highlighted in the

problem tree.

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| Ibel Ortíz-Salatti | Leinen de la C. Cartaya-Benítez | Oscar E. Velázquez-Soto | Rolando Mirot-Delgado |

About the main author

Ibel Ortíz-Salatti: She graduated with a degree in Information Science in 2018 and a Master's degree in Library and Information Science in 2025 from the Faculty of Communication at the University of Havana. She is a member of the Editorial Committee of the CECMEC's Journal of Health Regulation, where she works as a Research, Innovation, and Development Specialist and also oversees training activities.

Declaration of author responsibility

Ibel Ortíz-Salatti 1: Conceptualization, Data curation, Formal analysis, Research, Methodology, Resources, Software, Supervision, Validation/Verification, Visualization, Writing/original draft and Writing, review and editing.

Leinen de la C. Cartaya-Benítez 2: Conceptualization, Data Curation, Formal Analysis, Research, Methodology, Resources, Software, Supervision, Validation and Verification, Original Drafting and Writing, Review and Editing.

Oscar E. Velázquez-Soto 3: Conceptualization, Resources, Software, Supervision, Validation and Verification, and Writing, Reviewing and Editing.

Rolando Mirot-Delgado 4: Resources, Formal Analysis, Supervision, Validation and Verification, and Writing, Reviewing and Editing.