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Methodology for the systematization of research results in the professional training of students of the Faculty of Electrical Engineering

Metodología para la sistematización de resultados investigativos en la formación profesional de estudiantes de la Facultad de Ingeniería Eléctrica

Metodologia para sistematização de resultados de investigação na formação profissional de alunos da Faculdade de Engenharia Elétrica

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ABSTRACT
The article approached university professional training, from one of its main substantive processes, the research, which takes place in the undergraduate, in the period of preparation for employment and in the postgraduate. In this sense, the objective of the article was to propose a methodology for the systematization of the research results of the scientific potential of the Faculty of Electrical Engineering of the Universidad de Oriente, which contribute to the improvement of the continuing training of the graduates of the university programs. The research proposal was of an exploratory-explanatory type, which was developed through the use of theoretical methods such as analysis-synthesis, inductive-deductive and systemic-structural, which allowed an approach to theoretical referents of continuous training, the scientific-research activity , the research results and their systematization in the training process, as well as the characteristics of the proposed methodology were explained. Empirical methods were used, such as documentary analysis, interviews to directors, survey to heads of research projects, research professors and students, and triangulation for the processing and integral evaluation of the formative process, before and after the application of the methodology, together with other empirical methods such as socialization workshops and criteria of specialists and users, whose results revealed the pertinence and feasibility of the proposed methodology, accredited by the main transformations and impacts obtained in the formative process of the faculty.

Keywords: scientific-research activity, continuous training, research results, systematization of research

results.

RESUMEN
En el artículo, se abordó la formación profesional universitaria desde uno de sus principales procesos sustantivos, el investigativo, que tiene lugar en el pregrado, en el período de preparación para el empleo y en el posgrado. En este sentido, el artículo tuvo como objetivo proponer una metodología para la sistematización de los resultados investigativos del potencial científico de la Facultad de Ingeniería Eléctrica de la Universidad de Oriente, que contribuya al mejoramiento de la formación continua de los egresados de los programas universitarios. La propuesta investigativa fue de tipo exploratoria-explicativa, que se desarrolló mediante el empleo de métodos teóricos como análisis-síntesis, inductivo-deductivo y sistémico-estructural, que permitieron un acercamiento a referentes teóricos de la formación continua, la actividad científico-investigativa, los resultados investigativos y su sistematización en el proceso formativo, así como se explicaron las características de la metodología propuesta. Se emplearon métodos empíricos como análisis documental, entrevista a directivos, encuesta a jefes de proyectos investigativos, profesores investigadores y estudiantes y la triangulación para el procesamiento y valoración integral del proceso formativo, antes y después de la aplicación de la metodología, de conjunto con otros métodos empíricos como talleres de socialización y criterios de especialistas y usuarios, cuyos resultados revelaron la pertinencia y factibilidad de la metodología propuesta, acreditados por las principales transformaciones e impactos obtenidos en el proceso formativo de la facultad.

Palabras claves: actividad científico-investigativa; formación continua; resultados investigativos; sistematización de resultados investigativos.

RESUMO
No artigo, a formação profissional universitária foi abordada a partir de um de seus principais processos substantivos, o investigativo, que ocorre na graduação, no período de preparação para o emprego e na pós-graduação. Neste sentido, o artigo teve como objetivo propor uma metodologia para a sistematização dos resultados da investigação do potencial científico da Faculdade de Engenharia Elétrica da Universidade de Oriente, que contribua para a melhoria da formação contínua dos egressos dos programas universitários. A proposta de pesquisa foi do tipo exploratório-explicativa, a qual se desenvolveu por meio da utilização de métodos teóricos como análise-síntese, indutivo-dedutivo e sistêmico-estrutural, que permitiram uma aproximação aos referenciais teóricos da formação continuada, da atividade científico-pesquisa, foram explicados os resultados da pesquisa e sua sistematização no processo de formação, bem como as características da metodologia proposta. Foram utilizados métodos empíricos como análise documental, entrevista com gestores, levantamento de chefes de projetos de pesquisa, pesquisadores docentes e discentes, e triangulação para o processamento integral e avaliação do processo formativo, antes e após a aplicação da metodologia, em conjunto com outros métodos empíricos como oficinas de socialização e critérios de especialistas e usuários, cujos resultados revelaram a relevância e viabilidade da metodologia proposta, credenciada pelas principais transformações e impactos obtidos no processo de formação do corpo docente.

Palavras-chave: atividade de pesquisa científica; formação contínua; resultados de pesquisas; sistematização de resultados de pesquisas.

INTRODUCTION

The Higher Education, through academic institutions, has the mission to educate and drill future professionals and acquires the ethical commitment to develop in them the processes of understanding of the complex relationship existing between the scientific-technical development and society that condition it. Therefore, the aspiration is to train a professional capable of contributing to a technological education for all, which fosters the social understanding of science and technology.

The Cuban university, in order to respond to social demands, is in the midst of a constant process of improvement in higher education institutions, where "it is essential to structure within three substantive processes, whose integration allows a full response to the mission previously proposed, namely: training, research and university extension "(Horruitiner, 2006, p. 6), inextricably linked to each other, whose integration ensures the fulfillment of the mission of higher education in this 21st century.

Philosophical and sociological foundations of training professional are held in education-society relationship, which has place the university and business entities, whose social mission is integrally formed to subjects which develop the skills and competencies necessary to troubleshoot partner professionals, thro ugh undergraduate and graduate students, as a result of the transfer, ownership and development of scientific, technological and ecological culture, related with professional processes, work is and human will, come from the progress of science and world-wide technique and research results obtained by professors, business specialists and the students themselves.

The continuing training today requires new theorical methodological concepts, as an expression of the cultural, human character dialectical and complex proces ses that demand high levels of independence, scientific research and responsible development of professional creativity.

Therefore, it agrees that continuous training, according to Faria, Reis and Peralta (2016), is considered "a practice of rapid resolution of pedagogical problems, as a way of responding to different needs; it can be associated with intervention training" (p. 295), starting from the premise of achieving a coherent development of research activity and the systematization of research results, in the various settings, levels, stages and university programs.

The premises for the design of study plans "E" in Cuba (Month, 2016) pose the consistent application of the process of continuous training of professionals linked effectively to society and Resolution 138/19 (Month, 2019), reaffirms that its model is made up of the following components and features:

- Undergraduate training in broad-profile careers : Students are not only recipients of the scientific-technical content revealed by the development of global science and technology, by the professional and research experience of the professors, but also, through the investigative component, they are explorers and generators of new content that emerge from investigative activity from the scientific-student groups and research projects. Finally, they perform diploma work, where proposed solutions to professional problems existing in the production entities, through their labor and apprenticeships, which can

introduce and to generalize to other contexts.

- Preparation for employment: The recently graduated from the undergraduate may raise the level of professional continuous performance, and deepen the main themes that will approach from diploma work or other problems, looking for solutions to the technical problem, at the time that they can go to various forms of postgraduate improvement, where teachers offer new content that emerges from their main research results and their improvement.
- Post graduate Training: The graduates access to various graduate programs (specialization, master's and doctorate), which a re contained novel and updated from the main research findings and academic improvement of university professors and the international community, enabling making - depth research on priorities and main problems of the productive entities, reaching proposals for scientific and technical solution with recognized novelty, relevance and social impact.

From a cultural perspective, in the training process, the role of universities that allow promoting, developing and enhancing culture is recognized, fundamentally from research, as a substantive process, which takes place in undergraduate, in the period of preparation for employment and graduate school; hence, the need to address theoretical references of scientific-research activity, research results and their systematization in continuing education.

It is recognized that scientific research is regarded as a social process of construction-reconstruction of meanings and meanings among individuals involved, where knowledge production is developed as a synthesis of expressions of generality, built around the value purchased for and the own individuals.

The research process encourages the transition from the understanding of the research object, to the interpretation and transformation of reality, through various methods and techniques, which express the intention of the individual with the object, such as the expression
of their cognitive, transformative, evalu ative and communicative actions.

In this sense, educational scientific activity is assumed: … as a system of actions for the management of research, science, technology and innovation in the educational sector. Its dynamics is conditioned by the relationship between its components; therefore, it has a complex character and is determined by multiple factors. (Chirino, Vázquez, Del Canto, Escalona and Suárez, 2013, p. 5).

Moreover, several authors refer to the results of the research scientific activity, although Arms, Miranda, Echevarria and Tamayo (2020) requires are those cont ributions that constitute products of research activity that gives solution to theoretical practical problems and that materialize in new knowledge about the essence and practice of the object, given models, methodologies, strategies and productions (pp 7-8).

It is evident that the results of scientific research activity constitute a solution to a problem that is obtained by scientific means; hence, that a scientific result must have social impact and correspond to the specific problems that aims to address, because , the scientific and feasibility of the solution offered is only possible to validate from its applicability in practice.

The final result of an investigation, according to Chirino et al. (2013), is the

one that provides the solution to the research problem, since hypothetically it achieves the desired transformation, so, if it is not introduced and systematized in practice remains heightened the contradiction that rise to the scientific problem, what evidences the need for the systematization of scientific results as a research activity.

Authors like Cortón (2008), Mena, Keeling and Perez (2019), Ramos (2020), Escalona and Fumero (2021) and Leonard, Piclín and Bayeux (2021) study about Systematization category, however, according to Cortón (2008), it is recognized that it does not have a consensual definition, since it can be approached from psychology, didactics, educational research and experiences of popular education.

However, Mena et al. (2019) that: "The systematization begins to be frequently used in universities as an option against the debates to clarify the Pedagogical, epistemological and political foundations of Popular Education"(p. 131), motivated by the need for socioeconomic reorganization of the communities.

These authors agree on the premise that the systematization has as its starting point the dialectical conception of the world and has in practice, a vital reference for identifying issues on which action will be taken, from concrete conditions and warns that has a formative intentionality because it brings together or revives investigative skills and practices.

From this perspective, Cortón (2008) emphasizes that systematization is understood in different ways, as a theoretical method, as a process or as an investigative modality, which presupposes its continuous and permanent character in cognitive construction, its character of concrete practice, the logic explanation to man's experiences and the search for relationships in knowledge for the development of a new or, which are tested in research and must be considered in the process of introducing scientific results (pp. 5-6).

In this field, from educational research, systematization serves as a theoretical-methodological instrument for the study of educational processes, where it allows the establishment of creative and cooperative relationships between research professors and students, which makes it possible to carry out the process and Research tasks, in order to produce ideas, from the attention to their individualities, that allow the appearance of new elements, with the student in a leading role in their professional training.

These references, then, allow us to assume the systematization as a "generalizing theoretical method used for the ordering of the historical-pedagogical information obtained as a result of the theoretical and empirical methods, which allows revealing the essential knowledge, structuring it, classifying it and organizing it, (…) and constitute instrumental knowledge to be able to operate with them" (Ramos, 2020, p. 170)

Ramos (2020) highlights, among the main characteristics of the systematization, the confrontation and critical interpretation of the experience, which leads to an ordering and reconstruction of the lived process and its logic, the conceptualization and practical application.

By conceiving systematization as an activity that produces knowledge from and for the practice it imposes a challenge to the various educational research, from the process of systematization of research activity and the way how it addresses research outcomes, presented in the dissertation, master's and work diplomas, in the

continuing training of the professional of the electrical branch.

For all the above, the systematization of research results is assumed, according to Calzadilla and Ponce (2013) as: A methodological resource of educational research that allows the teacher to creatively reflect on their pedagogical practice to order, understand, produce and model new concepts as a scientific result (practical s and / or theoretical) for the purpose of improving quality in the Recent Finds of educational excellence. (p. 4)

The definition of systematization of research results of Calzadilla and Ponce (2013) supports the methodological view of Escalona and Fumero (2021) presupposes for development "A process of analysis, synthesis, interpretation, generalization and implementation of the best contributions derived from masters and doctorates, theses, teaching materials and technological products." (p. 1)

Due to all the above , the present article aims to propose a methodology for the systematization of the research results of the scientific potential in the continuous training of the students of the Faculty of Electrical Engineering at the Universidad de Oriente.

MATERIALS AND METHODS

This research proposal exploratory-explanatory type developed by using theoretical methods such as analysis-synthesis and inductive-deductive, allowing the approach to theoric fundamentals of continuing training, to scientific research research, research results and systematization in the formative process.

Critical appraisal of the grounds set possible the realization of inferences and generalizations that revealed concerning theoretical and methodological guidelines of university training, from the research component, which conduct to the design of the methodology for the systematization of research results by the structural systemic method, which made it possible to explain the Essential characteristics of the general structure, stages, phases and actions.

It was developed a diagnostic study of the characteristics of the systematize research results applied in the Electrical Engineering Faculty (Fie) in the continuous training process, in university programs and graduate programs. For this, the following indicators were taken into account:

- Relationship of the management of scientific activity between the university programs of the Fie, with the demands and priorities of strategic sectors.
- Relationship between the results of the projects and their introduction in undergraduate and graduate.
- Methodological procedures in systematizing research results.

The sample selected in an international way consisted of six directors of the Faculty of Electrical Engineering (66 %) and five entities of the territory, 25 professors (43 %), 120 students of the day course (27.7 %) and 30 undergraduate graduates and 30 postgraduate Fie, and 30 diploma works, 16 theses of masters and nine doctoral (100 %), conducted by researchers from Fie, above all, between 2014 - 2019.

To collect information on indicators made for an initial and final research diagnosis, empirical methods, led by documentary analysis (in acts

of directorate bodies and advisers faculty, reports of Balance Training Professional, Science, Technology, Innovation and Graduate Self-Assessment of the career, Self - Assessment and External evaluation of masters, profiles of research projects and Plan of methodological work of the departments and the Faculty were used (between 2017 and 2020).

Then, the applied interview to managers and chiefs of the career to determine the features of the relationship management of scientific activity among university programs of the Fie with the demands and priorities of strategic sectors and professional performance students, from the treatment of the systematization of research results. The n they surveyed principals of research projects, teachers and students about the functioning of projects and ways used for systematizing research results in the formation of the professional.

The method of triangulation was used, assuming a Samaja (2018), by the advantages and steps for the processing and interpretation of the results in the integral evaluation

of the training process, before and after the application of the proposed methodology, whose relevance and feasibility was assessed from the application of the socialization workshops and the method of criteria of specialists and users, with a sample that represents the management group and faculty with professional experience in research activity, teaching experience in the training of professionals with an electrical profile, as well as scientific or academic degree and teaching category; are, in addition, the main users and responsible for applying the methodology proposed .

RESULTS

From the critical-evaluative analysis carried out on the epistemological foundations of the continuous training process in Cuba and the management of the systematization of research results in university programs, the existence of valuable references that offer relevant theoretical guidelines to address the investigative component and their role at each stage of continuing education.

But also, from the perspective inductive-deductive about theoretical components, is revealed or the presence of theoretical and practical treatises on the design of the systematization of research results based on training, whose references reflect structural and methodological deficiencies in its projection, treatment, monitoring and evaluation of its academic, scientific-technological, socioeconomic and environmental impacts, which limit the systemic and integral character in its methodological achievement in undergraduate and graduate studies.

At the same time, the lack of foundation of methodological tools for the systematization of research results stood out, which coherently harmonize their general and specific purposes with the requirements and particularities for each stage of the continuous training of professionals.

The initial diagnosis of the systematize research results in the process of continuous training of the faculty, according to the assumed indicators, revealed or notable strengths and weaknesses, integrated in the following aspects significant:

1. Deficient publications on basis data of high impact, which ranged only between 36% and 50% in groups 1 and 2, between 2015 and 2017, revealing

difficulties in the socialization and visibility of research results as the first step of their introduction into training and business practice.

2. Three graduate programs were executed, but we do not have a specialty program that respond to the continuous training of graduates of the Curriculum E and demands of recipient companies.

3. Lack of orientation and motivation of young professors for doctoral training and insufficient leadership in part of the scientific potential, which affects scientific production and the systematization of research results.

4. It increased the amount of five to 11 scientific student groups and from 40-107 members (22.47% of enrollment); but all of the directors and 71.6% (86) of students of the faculty surveyed indicates that the attention of the coordinators, operation and monitoring still are deficient, as the student participation in research projects and scientific events.

5. The directors of the faculty declared that 20 relevant research results are introduced into the training, but they recognize that they do not systematize properly or done in isolation and unsystematic, and there is sufficient evidence of its systematization in strategic sectors.

6. 35% of teachers coincided that it is insufficient the incidence of research results in solving the problems of the territory, since the introduction and systematization in the specialist training in electrical profile.

7. The self - assessment report of engineering careers does not explain sufficiently the role of systematization of scientific results in improving quality, from managing the research activity.

Triangulation of data collected on indicators made for the initial diagnosis of the systematize research results, through documentary analysis, interviews and surveys applied, allowed
defining the main cause of the shortco mings detected, such as:

- The scientific activity among university programs of Fie was not properly managed, from the profiles of projects; the career and postgraduate groups do not consciously assume it for the systematization of the research results, according to 46.5% of teachers and managers.
- There was spontaneity in the establishment of the relation between the results of the projects and their introduction into undergraduate and graduate, as to their insufficient planning from the direction of programs careers and graduate and companies as beneficiaries, as confirmed by 100% of teachers and managers.
- It was recognized that the methodological procedures to undertake the systematization of results research in the training process, according to 35% d research professors and 65% did not know the existence of a specific tool in the directed faculty are not dominated.

The evaluation of diagnostic results allowed to reveal that there is a dispersion and lack of clarity as to the purpose of systematizing and axes on systematization and the research results as deficiencies expression existing in strategic management of the scientific-research activity and postgraduate by managers, scientific leaders, professors and students in the faculty; to others, it lacks a

methodological integrator procedure, which affects the limited treatment of introduction and generalization of research results.

So, it is emphasized that the methodological tools to develop to promote the systematization research results must meet customized training strategies and educational collective significance with a systemic, contextual, recursive and closed loop among all the college programs, in close link with the business entities that make up the continuous professional training process in Cuban higher education.

In response to the results of the diagnosis and to the objective of this work to provide treatment to the difficulties encountered, it was designed a methodology for the systematization of outcomes research at the Faculty of Electrical Engineering.

The methodology has as general objective: systematize research results produced by and scientific potential of the FIE in the process of continuous training of specialists in the electrical profile of the UO, with a contextualized character, integral, Recursive transformer and that favors the improvement of professional performance. It is structured in three stages:

Stage I. Preparation of the process of systematization of research results and the group of researchers.

Objective: design the preparation of the process of systematization of research results and the group of researchers, starting from contextual assessment of the theoretical and practical contributions, diagnosis and training of teachers, who will permit to the introduction and generalization of scientific results.

The first stage (preparation) comprises the phases of: assessment, diagnostic and training classification to guarantee the necessary preparation in the preparation and implementation of contextualized results.

Phase 1- Valuation classification:

- Register the doctors, masters and diploma works, with the respective results of their research in the last 5 years, evaluating the possible educational and technological contexts of application.
- Analyze the research results that respond to the systematization axes assumed as priorities of careers, masters and doctorates.
- Elaborate the evaluative Map (Table 1): research tool for identification and compilation of results research of diploma works, master's theses and doctoral degrees and their possible application contexts.

Table 1- Assessment map of the research results.

Resultados de investigación		Contextos de aplicación en la formación continua						
		Pregrado				Preparación para el empleo	Posgrado	
Autor/Tutor	Resultados	Carrera	Disciplinas	Asignaturas	Año		Maestría/Especialidad	Doctorado
X1								
Xn								

For the elaboration of the value map of the research results, it is required:

- Characterized theoretical and practical results that are relevant to the subject of systematization and axes of systematization, according to research projects.

Systematization object of research results: Main scientific results (pedagogical and technological) that provide solutions to problems.

Pressing investigated, given in the theoretical-methodological conceptions, models, methodologies, strategies and system of procedures.

Axes of systematization of research results: They are determined by the essence of the object of study and principal traits that typify and correspond to the main themes and priorities that address the research of the university and faculty, as well as pressing problems and priorities of the country's strategic sectors. In the Faculty of Electrical Engineering, the following are declared as main axes of systematization:

> Systematization axis 1: Cleaner energy technologies and processes.
>
> Systematization axis 2: Development of the automation of industrial processes, manufacturing and transportation.
>
> Systematization axis 3: Improvement of the training processes of professionals of the electrical profile of the medium and higher technical levels.

Phase 2- Diagnosis:

- Sort pressing problems, according to the research and priorities for strategic sectors related to the faculty, based on the Bank of career problems, graduate programs and research projects.
- Identify and rank the research results of the scientific potential, according to the systematization axes and real possibilities of introduction or generalization in the formative or socio-productive processes.
- Elaborate and apply a diagnosis to the research professors and specialists on the domain of the essential content of the research result to be introduced in the pedagogical or productive practice to detect cognitive, pedagogical and technological needs to systematize each research result.
- Elaborate a training plan to achieve updating professional knowledge and skills about such theoretical and practice contribution to systematize.
- Present the map of to the research results and capacitating plan of researchers in the plenary of the Scientific Council and Board of the faculty, which accept the introduction into disciplines and subjects of careers, courses and content related of the postgraduate programs in progress.

3- Training phase: Develop different forms of postgraduate education or methodological work in groups of careers, graduate programs and research projects aimed at the preparation of researchers of the specialists of the productive entities, to carry out the systematization and introduction of scientific results in the continuous training process.

Stage II. Execution of the process of systematization of investigative results

Objective: execute the process of systematizing research results, developing scientific materials and teachers for disciplines, subjects and Postgraduate courses defined for its introduction.

Phase 1- Elaboration of the research and teaching materials results:

- Make materials which collect the essential aspects of research results (the result tab), accompanied by theoretical and practical information illustrating the content key of the scientific and technical input.
- To elaborate the teaching materials that show the didactic-methodological routes and procedures for the professionalized treatment of the new content that addresses the research result to be introduced in continuous professional training, which is developed in the various training and socio-productive contexts.

Phase 2- Implementation of the introduction of research results:

- Characterization of the teaching-learning process of subjects.

- Identify the disciplines, subjects, years and groups, whose conditions and potentialities allow the didactic intervention of the introduction of the expected result, with the help of teaching staff and methodological work.

- Prepare the forms of teaching (conference, practical class, laboratory), establishing the methods for the professional treatment of the scientific-technological content that addresses the research result to be introduced.

- Follow-up of the introduction of research results.

- Determine the technical collection of didactic-methodological evidence and individual and collective student performance, when receiving and treating the essential aspects of the content of the outcome research that is introduced into the subjects and the assessment of the performance of the research professor.

- Prepare the group of students where the research results to foster motivational elements about the content to try and assimilate into the teaching-learning courses are introduced.

- Of didactic intervention of the introduction and generalization of the investigative result in the assignments.

- Establish time guidelines for intervention in the group or group's time for recording, depending on the complexity of the materials.

- Register the didactic-methodological and evidence the performance of students, teachers and researchers duri ng the process of introducing the research results, revealing major changes and impacts on persons involved in the educational experience.

Stage III. Evaluation of the systematization of research results.

Objective: Evaluate the degree of effectiveness of the process of systematization of results research on the training of specialists and the business context.

- Verification of the transformations and impacts obtained.

- testimonial checks through the collection of written assessments, recordings and footage assembly laboratory practice, assessments, evidence of performance users, inside and outside the classroom.

- Take statements from teachers in charge of the treatment of scientific-technical content in subjects, indicating achievements and difficulties, derived from the application of the methodology of systematization of research results.

- Carry out the descriptive and inferential statistical processing of the data obtained by the different routes on the individual and collective evidences, before, during and after the introduction of the investigative results.

- Assessment of the process of systematization of research results.

- Prepare an evaluative report on the fulfillment of the proposed systematization of the research results provided by research professors, methodological bodies, advisers and management of the faculty.

- Carry out a workshop to socialize the assessment report on compliance with the proposed systematization of the investigative results for the

- Feedback and monitoring of achievements and main difficulties, which require attention and treatment in future systematization processes.

Consecutively, it develops socialization workshops that allowed the group reflection specialists, facilitated the recognition and argument confirming the feasibility, feasibility, relevance and novelty of the methodology proposed for the systematization of research results at the Faculty of Electrical Engineering, endorsed by 100% of the participants.

The application of the method of criteria specialists and users, with a sample matching the members of the socialization workshops, as are, moreover, major users, receivers and managers of systematizing the methodology proposed and represent the collective management and faculty of the Faculty of Electrical Engineering, revealed the following assessment criteria:

- They pointed out that the epistemological foundations that support the proposed methodology reveal full coherence with the most current existing approaches arou nd the management of scientific-research activity in universities, fundamentally for the systematization of research results; therefore, they recognize it as a valid pedagogical-investigative tool that raises the quality of the professional training process in the faculty.
- They emphasize that the methodology has a systemic nature, a close relationship between its stages, phases and its main actions, as well as relevance to stimulate the transformation of training practice and the teacher has a new and coherent tool to apply creatively in the formative process, even in production scenarios where research results are introduced.
- They agree that the methodology elaborated as a practical tool is a response to the improvement of the process training, from a holistic perspective, contextualized and recursive among university programs, the consistency of the proposed actions at each stage, especially invidious map the research results for its systematization.

With the application of this methodology for the systematization of the research results in the continuous training of the electrical profile professional in the Faculty of Electrical Engineering, it was possible to improve quantitative and qualitative indicators, based on the socialization, visibility and introduction of said results, not only in university processes, but also in production processes, which express the achievement of the main transformations and impacts, among those that relate:

- Increase from three to 10 courses offered, three running editions of the two masters and the opening of the doctoral program in Automatics, where several research results are introduced to teachers and professionals in the eastern region.
- It increases from eight to 11 the scientific publications and approved two articles in journals indexed in international database of high impact for socialization and visibility of research results as the first step of systematization.
- They were achieved five records and intellectual property claims a patent.
- It was obtained awards in student scientific events (Hundreds) of the UO in 2017 (3), 2018 (4), 2019 (3) 2020 (3) and a Mention in National Forum of Technical Sciences 2019.
- Technology Processes are improved in the company's Acinox-Las Tunas, Serconi - Holguín and Company D and Automation Integral (CEDAI) of Santiago de Cuba, beginning in the design and application of technologies Cuban IN advance d automatation by professors, scholars and students of Engineering in Automation.
- Professors, students and specialists from the Electricity Company of the Guantánamo province carry o ut feasibility studies for the assembly of photovoltaic systems and their penetration into the National Electric Power System.

Finally, the noted character Flexible contextual, inclusive, problematizador and the methodology for systematizing research results in continuing training, which allows adjustments to the characteris tics of the training context and ensures the renewal of the treatment curricular racing programs postgraduate studies and their academic, work, research and socio-productive activities.

DISCUSSION

The results of the epistemological foundation and the assessment of the diagnosis on the continuous training process and the systematization of research results detected the existence of cognitive, methodological and investigative deficiencies, as an expression of the dispersion and lack of clarity regarding the object of systematization and the axes of systematization of the research results that are generated by the development of scientific activity in the faculty.

So, as they indicated Orama, Pulido and Mena (2021) that "lacking systematize the results, when they are obtained, leading to insufficient analysis and reflection and from the activity in the cognitive order, contributing to base, give theoretical and didactic-methodological coherence to the professional training process" (p. 59).

Then, it could be appreciated that the inconsistencies exposed are manifested in the limitations , in the modes of professional performance of undergraduate and graduate students, in the face of the resolution of the problems of the profession, the lack of scientific-technological knowledge, professional skills and attitudes ethical and moral that should characterize the professional performance, which underlies insufficiencies in the projection, design, proposal and implementation of methodological procedures consistent and integrators for the systematization of research results at the Faculty of Electrical Engineering at the University of Oriente.

Thus, the systematization of research results is recognized as a key element for the preparation and improvement of the professional performance of students, teachers and researchers and is seen as an indispensable tool for the study of their own innovative experiences, which makes it an innovative way for competent training, improvement and enables the introduction, dialectical articulation, evaluation and generalization of research results (Calzadilla and Ponce, 2013 and Ramos, 2020), as well as achieving the main transformations and educational, scientific-technological, socioeconomic and environmental impacts.

Therefore, a methodology was proposed for the systematization of results research of the potential scientist at the Faculty of Electrical Engineering, that contributed and to the improvement of continuous training SDE university programs.

The results of the socialization workshops, the criteria of specialists and users and the partial application of the methodology for the systematization of research results in the formation continuous professional electrical profile, using the method of triangulation, possible to corroborate the relevance and feasibility of the proposed methodology, credits given by the major changes and impacts achieved, It is contributing to the improvement of the process of training and improvement of professional skills of students in the faculty.

The methodology exposed to systematize the scientific results was considered coherent and novel from the relationship between the stages, phases and actions that expresses the logic functionality from valuate map and contextualization in undergraduate preparation for employment and postgraduate studies, which allows its link and integration with academic, scientific-research, labor and extension activities; hence it stands as an alternative solution to the problematic and that confirms compliance of the objective of this study.

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Authors declare not to have any conflicts of interest.

Authors´ Contribution:

The authors prepared the article, complying with the different actions corresponding to this purpose.