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Original article

The research project as a fundamental scenario in the management of doctoral training

El proyecto de investigación como escenario fundamental en la gestión de la formación doctoral

O projeto de pesquisa como um cenário fundamental na gestão do treinamento de doutorado

Vilma María Pérez Viñas[1] 0000-0003-3041-096X vilma.perez@upr.edu.cu
Arturo Pulido Díaz[1] 0000-0002-8694-9836 arturo.pulido@upr.edu.cu
Mayra Ordaz Hernández[1] 0000-0003-4729-2197 mayra@upr.edu.cu
Maricela María González Pérez[1] 0000-0003-2617-5370 maricela@upr.edu.cu

[1] University of Pinar del Río "Hermanos Saíz Montes de Oca". Pinar del Río, Cuba.

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ABSTRACT

Doctoral training, linked to scientific research, through research lines, groups, or projects, is highly relevant today. In Cuba, although there is a legal framework regulating doctoral training and everything related to science, technology, and innovation, there are no methodological guidelines for its implementation. The purpose of this work was to offer a methodological proposal for the management of doctoral training, linked to scientific research, that takes advantage of the potential of the research project as a fundamental training setting. Document analysis, scientific observation, and unstructured interviews were used. The result was the harmonization of the regulations

Translated from the original in Spanish

established by Resolution 3/2020 of the National Commission of Scientific Degrees and Resolution 287/2019 of CITMA, on the System of Programs and Projects of Science, Technology and Innovation, as the legal basis for doctoral training with the research project as a fundamental scenario, based on the experiences obtained in the doctoral program in Educational Sciences of the Center for Studies in Educational Sciences of the University of Pinar del Río "Hermanos Saíz Montes de Oca" and the research projects associated with it.

Keywords: doctoral training; methodological proposal; research project.

RESUMEN

La formación doctoral, en vínculo con la investigación científica, a través de líneas, grupos o proyectos de investigación es de gran actualidad. En Cuba, si bien existe un marco legal que regula la formación doctoral, así como lo relacionado con la ciencia, la tecnología y la innovación, no se aprecian indicaciones metodológicas para su implementación. El propósito de este trabajo fue ofrecer una propuesta metodológica para la gestión de la formación doctoral, en vínculo con la investigación científica, que aproveche las potencialidades del proyecto de investigación como escenario fundamental de formación. Se empleó el análisis documental, la observación científica y la entrevista no estructurada. El resultado fue la armonización de las regulaciones establecidas por la Resolución 3/2020 de la Comisión Nacional de Grados Científicos y la Resolución 287/2019 del CITMA, sobre el Sistema de Programas y Proyectos de Ciencia, Tecnología e Innovación, como base legal de la formación doctoral con el proyecto de investigación como escenario fundamental, a partir de las experiencias obtenidas en el programa de doctorado en Ciencias de la Educación del Centro de Estudios de Ciencias de la Educación de la Universidad de Pinar del Río "Hermanos Saíz Montes de Oca" y los proyectos de investigación asociados a este.

Palabras clave: formación doctoral; propuesta metodológica; proyecto de investigación.

RESUMO

A formação doutoral, vinculada à pesquisa científica, por meio de linhas, grupos ou projetos de pesquisa, é um tema muito atual. Em Cuba, embora exista um marco legal que regula a formação doutoral, assim como tudo o que está relacionado à ciência, tecnologia e inovação, não há indicações

metodológicas para sua implementação. O objetivo deste trabalho foi oferecer uma proposta metodológica para a gestão da formação de doutores, vinculada à pesquisa científica, que aproveite o potencial do projeto de pesquisa como cenário fundamental de formação. Foram utilizadas análise documental, observação científica e entrevistas não estruturadas. O resultado foi a harmonização dos regulamentos estabelecidos pela Resolução 3/2020 da Comissão Nacional de Diplomas Científicos e pela Resolução 287/2019 do CITMA, sobre o Sistema de Programas e Projetos de Ciência, Tecnologia e Inovação, como base legal para a formação de doutores com o projeto de pesquisa como cenário fundamental, com base nas experiências obtidas no programa de doutorado em Ciências da Educação do Centro de Estudos em Ciências da Educação da Universidade de Pinar del Río "Hermanos Saíz Montes de Oca" e nos projetos de pesquisa associados a ele.

Palavras-chave: formação de doutores; proposta metodológica; projeto de pesquisa.

INTRODUCTION

Doctoral training, linked to scientific research, through research lines, groups, or projects, is a topic of interest and great relevance today. Researchers from the sectoral project Improving doctoral training and its contribution to development, code: PS223LH001-015, have dedicated time and effort to this topic, some of which results are presented in this article.

At the international level, as Taylor (2023) argues, significant changes in doctoral training have occurred over the past three decades, contributing to improved and more flexible submission and completion deadlines, as well as employability. This has led to the structuring or professionalization of programs, with the inclusion of courses that are sometimes integrated into the general program, training in employability-related skills. As a result, many institutions have implemented structures to support doctoral studies, including graduate schools, doctoral colleges, doctoral research schools, training centers, and industry associations.

In this line of analysis, Ruano-Borbalan (2022) argues that one of the main characteristics of this emphasis on useful knowledge processes is the growing concern for the support and development of new skills; in particular, competencies that correspond to the definitions of international organizations (for example, the OECD competencies for the 21st century), emphasizing the

development of skills such as communication skills, adaptability to environments and competencies to work in intercultural contexts.

In Cuba, references to the topic addressed are scarce. González-Hernández (2020) points out that the methodological documents that govern the organization of science, technology, and innovation in universities and research centers of the Ministry of Higher Education include the policy for strengthening science, technology, innovation, and doctoral training.

The general objective of this policy is to transform the management of Science, Technology, Innovation (STI) activities and training, establishing, among others, the procedure that guides the implementation of a coherent system of doctoral programs linked to research projects in prioritized lines, characterized by intense scientific activity (González-Hernández, 2020).

Also referring to the legal framework, there are legal regulations relating to the National Commission of Scientific Degrees (CNGC), among them, Resolution 3/2020, which redefines and updates doctoral training, through specific instructions for the development and/or redesign of doctoral programs, as a requirement for their approval by the CNGC.

Regarding research projects, since 2012 they have been considered the basic unit for the organization, execution, financing, and monitoring of scientific research activities and tasks aimed at achieving specific objectives and contributing to the solution of the problems that led to their implementation, according to the Ministry of Science, Technology, and Environment (CITMA). More recently, Resolution 287/2019 (CTIMA, 2019) updated the planning, development, approval, financing, and monitoring process of the Science, Technology, and Innovation Programs and Projects System and regulated it.

In this regard, Torres *et al.* (2020) in a study on doctoral training in pedagogical sciences point out that doctoral students, in addition to socializing the results in the scientific sessions and workshops of the training process, do so from the research project in which they participate at the end of each year, in the process of assessing technical science and innovation, a reductionist conception of the project as a training space, in our opinion.

It is worth noting here that doctoral training linked to research projects has historically existed in Cuba. Applications for enrollment in a doctoral program, in the various formats it has taken, have always considered the requirement that the applicant be a member of a research project. Since the

entry into force of Resolution 3/2020, this takes on particular significance because, from the very beginning of the doctoral program, it must be made clear that the doctoral student is linked to projects and integrated into research groups through which their doctoral training proceeds. In this way, the research project becomes the fundamental stage of this training.

However, the vision of the research project as a training space is still very limited in its management, which is facilitated by the existing legal framework, with numerous regulations from various ministries, lacking methodological guidelines for their implementation, which complicates the work of authorized institutions with the respective doctoral training programs.

In this regard, the good practices accumulated in the management of the doctoral training program in Educational Sciences, accredited and ratified as Excellence, with the prominence of the research projects of the Center for Studies in Educational Sciences (CECEPRI) and the dependencies of the Faculties of Early Childhood and Junior High Education of the University of Pinar del Río "Hermanos Saíz Montes de Oca" can be useful, due to the results achieved in the implementation of the research project as a fundamental training scenario.

Thus, this work aims to offer a methodological proposal for the management of doctoral training, in connection with scientific research, which takes advantage of the potential of the research project as a fundamental training scenario.

MATERIALS AND METHODS

The application was carried out during 2022 in the Doctoral Training Program in Educational Sciences, accredited as a Excellence Program, managed by CECEPRI as an authorized area for doctoral training. Methods such as documentary analysis were used to determine the main foundations and legal framework of the doctoral training process; scientific observation of 15 workshops and 11 thesis seminars to verify the applicability and effectiveness of the training activities in three research projects; and unstructured interviews with 10 tutor professors and seven students to gather their opinions on the research topic. The information obtained as a result of methodological triangulation was organized into a SWOT matrix.

RESULTS

Based on the documentary analysis, regulatory regulations from two ministries, the Ministry of the Environment and Natural Resources (MES) and the Ministry of the Ministry of the Environment (CITMA), were found to provide a legal framework for the doctoral training process. However, there is a lack of methodological guidelines specifying how to implement this training in the research project as a fundamental training setting.

Three stages of the doctoral training process were determined in the Cuban context, characterized by developing in research projects as fundamental scenarios, namely:

- Stage 1. Admission process for a Doctoral Program. This stage takes place before enrollment is officially confirmed, during the pre-application and admissions process, during which applicants are designated as applicants.
- Stage 2. Doctoral training process. This begins with official enrollment and continues throughout the period during which all the activities established by the Program are carried out to meet the requirements and grant the corresponding credits to the professionals in training, who are now known as doctoral students.
- Stage 3. Postdoctoral training process. Subsequently, after the scientific degree has been awarded and they have received the titles that accredit them as such, those now known as doctors must maintain their connection to the programs and the ongoing scientific life through research projects and groups.

Each of them corresponded to the general objective conceived at the country level for this training and the specific objective of the program in question.

The results obtained from the methodological triangulation were organized in the following SWOT matrix (Tables 1 and 2). The external and internal analyses were carried out on the basis of the dimensions of the management of the doctoral training process with the project as the fundamental scenario.

Table 1. Internal analysis

Strengths	Weaknesses
Effective program management, led by the Doctoral Committee, ensures the integration of doctoral students and mentors into R&D projects that address the eight lines of research.	Project managers with different levels of preparation to manage doctoral training.
The program developed documents with indicators that facilitate the evaluation of each activity and the granting of credits.	A system of regulations for managing doctoral training that is frequently updated, without allowing time for consolidation and validation.
Systematic encouragement of the advancement of doctoral students in the research groups of each project, with the support of doctors, specialists in the research topic, belonging to the authorized institution, the territory, and the country.	
All members of the teaching and tutoring faculty belong to one or more research projects.	
Implementation of a postgraduate development didactic in the management of doctoral training.	
Significant methodological work within the program to enhance the training of the teaching staff.	

Table 2. External analysis

Opportunities	Threats
The program is managed according to current regulations (Res. 3/2020), which align the program with international doctoral training paradigms.	Lack of articulation between the regulations for the management of research projects (Resolution 287/2019) and those that regulate doctoral training (3/2020).
Existence of sufficient contracted research projects that respond to the lines of research of the program and allow for the training of all doctoral students with one or two tutors.	There is no correspondence among the contracting of projects, the number of PhDs participating in them (in the case of sectoral projects, only up to 10 PhDs can participate), the duration of these projects (sometimes three years), and the calls for applications and the duration of the doctoral training process, which can be up to four years and extendable.
Support from the University of Pinar del Río's Undergraduate Committee and the Vice-Rector's Office for Research, Information, and Postgraduate Studies, as well as the authorized institution, in general, for the doctoral training process of the program.	Instability in training organization methods due to health, weather, and energy contingencies.
The existence of the Preparatory School for Doctoral Training, which aligns with the guidelines and priorities of the doctoral program in Educational Sciences.	Demotivation of training participants (doctoral students and faculty) for economic reasons.
The establishment of the characteristics of an international professional in the objectives of the 2030 Agenda, which enables the program to adopt them as a training paradigm.	
The existence of governance and management in Cuba based on the pillars of science, innovation, and communication, which allows the program to adopt these principles in its management.	

DISCUSSION

Regarding the legal framework, the methodological proposal for managing doctoral training, with the research project as its fundamental setting, constitutes an alternative to harmonizing the regulations established by Resolution 3/2020 of the National Commission for Scientific Degrees of the Republic of Cuba. This establishes that the training of doctors in a specific area of knowledge is organized around a doctoral program, which focuses on scientific research and also includes other theoretical and methodological training activities. Resolution 287/2019 of the CITMA (National Council of Science, Technology, and Innovation) legislates the System of Science, Technology, and Innovation Programs and Projects as a component of the Science, Technology, and Innovation System of the country and constitutes the organizational form for the planning, financing, execution, evaluation, and control of research, development, and innovation activities.

Resolution 3/2020 establishes in its Article 2 that the program of an institution authorized to train doctors: (a) is supported by the scientific traditions of the institution, backed by the results of previous research, publications, accreditations, and national and international recognition; (b) has theoretical and methodological frameworks shared by the scientific community in its area of knowledge; (c) is based on lines of research to address problems of scientific and practical interest that require academic efforts for their study and respond to current national, sectoral, and territorial needs and priorities, as well as perspectives from which doctoral topics are determined; (d) has scientific leaders in each of the research lines of the program with experience in doctoral training; (e) is associated with research groups and projects for the integration of doctoral students in their doctoral training process; and (f) provides the necessary material, financial, infrastructure, and information conditions for its development.

This same resolution dictates in its Article 3 that the lines of research supporting the program are characterized by: (a) belonging to lines of research conducted by the institution or by other institutions participating in the program; (b) investigating problems of scientific and practical interest; (c) being in correspondence with national, sectoral, and territorial scientific priorities; (d) having scientific leaders with the capacity to lead the doctoral training of the program; (e) existence of research projects associated with possibilities of insertion of doctoral students; (f) presence of linked research groups to assume the work of doctoral students; (g) institutional research and teaching trajectory recognized nationally and internationally; (h) having scientific publications from the institution; (i) having obtained scientific results introduced into social practice; (j) being linked

to postgraduate academic training (specialties and master's degrees); (k) having received recognition or awards for scientific results; and (l) having defended doctorates in topics related to this.

Further, the aforementioned resolution, in its Article 17, defines that the institution authorized for the training of doctors responsible for the program, when enrolling a doctoral student, must take into account the legislation in Agreement 8625/2019 of the Council of Ministers and is obliged to: (a) assign the doctoral topic, which responds to one of the research lines of the program, based on its current relevance, significance, and originality at the scientific level; (b) establish its connection to a research project; (c) arrange for its incorporation into a research group; (d) assign a tutor or tutors to direct it; and (e) facilitate the relationship with other specialists and participants in the program, in accordance with the individual training plan.

Furthermore, Article 28 of this same resolution establishes that the program is characterized by being research-focused, essential, and flexible. This implies that the main activity is the achievement of scientific results from the beginning of doctoral training, through in-depth study of the subject matter, embedded in a research project, in search of solutions to scientific problems and needs of diverse scope. This facilitates research training, leadership, participation in events, and the publication of articles in journals of national and international standing.

For its part, CITMA Resolution 287/2019 offers few and unspecific elements to guide project leaders on how to contribute to the doctoral training process of researchers. Reference was found to: coordinating the work of project participants and monitoring completion of the stages; ensuring the maximum scientific rigor of the results; and evaluating the work of the research team members of the project, among others. These elements could be applied to the aforementioned process, but they do not offer any means to achieve them.

Similarly, the Resolution itself proposes a set of indicators to determine the degree of individual participation by the project leader in the monthly evaluation of its members, such as: timely completion of assigned tasks; quality of work performed; level of complexity and significance; creative or innovative contribution; and effects or impacts of their activity on the results obtained. All of this, like the previous example, is applicable to all researchers, without implying the uniqueness that a consciously organized training process demands at this level.

At the international level, the organizational framework for doctoral training is generally complex. In Europe, reports from a 2017-2018 survey confirmed that in around three-quarters of universities, doctoral training is organized into programs with specific elements such as courses taught, scientific milestones, and mobility options. In six out of ten universities, it is managed through an organizational unit, the "doctoral school," which, among other things, oversees program development, ensures quality, and develops regulations and guidelines. For 10% of institutions, doctoral training is organized jointly with other universities. Only 5% of European institutions reported that their doctoral training operates without institutional oversight. For many, this means that what was once an exclusive relationship between supervisors and supervisees has become a de facto partnership among supervisors, doctoral students and the institution (European University Association. Council for Doctoral Education, [EUA.CDE], 2022).

Likewise, the central role of doctoral students within research projects is recognized, as it is argued that a substantial portion of scientific efforts would not be possible without their contributions (USA. CDE, 2022); although viewed this way, a unidirectional relationship is seen, as the formative dimension of the project or research groups is not emphasized.

In Latin America, from the pedagogy of doctoral training, for Castillo-Bustos *et al.* (2023) "the research management ecosystem that the program structures around the student is fundamental" (p. 141). This takes into account the director/tutor, the academic spaces created for this training, research from one or more lines generated by the program and the connection of the doctoral student in research groups, in which context they develop their doctoral thesis and carry out theoretical, methodological and epistemological discussions that allow them to construct and personalize the work, as well as socialize the results.

Regarding the stages of doctoral training, it is important to note that the management of doctoral training, with the research project as its fundamental setting, constitutes a process that encompasses a longer time cycle than the period from enrollment in a doctoral program to the long-awaited defense of the doctoral thesis and the granting of the PhD degree. This process requires prior and subsequent actions if it is conceived and implemented as true continuing education, comprehensively transforming the personality of the professional who receives a scientific degree, with scientific research as its fundamental educational activity. The results discussed here are based essentially on the experiences of the doctoral program in Educational Sciences at CECEPRI, University of Pinar del Río.

Stage one (before) relates to the actions to be followed once the applicant identifies a potential research topic. Stage two (during) addresses the actions that will enable the doctoral candidate to acquire the research skills necessary to successfully complete the research. Finally, stage three (after) ensures that the newly graduated doctor generalizes the scientific results, performs higher professional roles in which they put the appropriate skills into practice, and begins the preparation and practice of teaching a doctoral training faculty, gradually assuming roles as a member of the group, in scientific sessions, on different-level committees, and as a tutor, in one of the most important and complex tasks of this process: training new doctors.

At each stage, the premise is that a process characterized by flexibility and adaptability is being modeled, both to the different areas of knowledge and to the uniqueness of the subjects involved. Based on our experience, it is recommended that, prior to these stages, subjects participate in the various more general preparation options available at Cuban universities, either institutionally or through exchanges with doctoral programs. The different modalities are related to the specifics of scientific degree training, the fundamental requirements, and current regulations regarding the dynamics of admission to a program. These stipulate research on a relevant and current topic within specific lines of research, as well as the mandatory connection to a research project.

Stage 1. Process of admission to a doctoral program

The objective of this stage is to create the conditions for the applicant to be optimally prepared to identify the research topic. The doctoral program, designed based on the already determined core research lines of the authorized institution, establishes specific lines of research (with the respective groups and projects) based on scientific tradition, notable results, and a group of PhDs, experts in these topics, to mentor interested parties on potential research topics within that field of scientific knowledge.

At this stage, actions such as:

Exchange and familiarization with the program

It is common for a doctoral candidate's entry into the program to begin with the interested party approaching the doctoral group, where they are provided with information on the lines of research of the program, the groups and projects under contract or in the process of approval, the history of the main research topics, as well as those that constitute problems of scientific interest at the

international, national, and local levels, in accordance with existing priorities. This way, the applicant gains access to relevant information to identify a potential research topic.

Familiarization can be carried out in group or individual work sessions or by combining both variants, in person or remotely, in which the doctoral program coordinator, the research lines and groups coordinators participate. and project managers.

Presentation by the applicant of the ideas to be investigated

The applicant's presentation of preliminary ideas on the potential research topic within the research line, group, and prospective project, which would constitute the fundamental framework for their doctoral training, can take place in a scientific session of the research project, during which the importance and relevance of the topic presented is debated. This is a time for scientific discussion to make recommendations to the applicant.

This is an activity that can be highly varied, depending on the stage of development of the applicant's research idea, which can range from zero to a fairly complete version, based on previous research at previous levels, whether diploma theses, master's theses, or others. Another factor to consider is that the preconceived idea does not always have the potential to be developed within a given program, for various reasons, such as the lack of related lines of research, overlap with research already defended or in progress, or the impossibility of integrating it into available or soon-to-be-contracted research projects, among others.

In our experience, this scientific session should be characterized by the openness of the program, the ability to actively listen, and flexibility, within the possibilities offered by current projects, those planned for the immediate future, as well as the researchers' specialties and research experience. For international applicants, this analysis focuses on the research groups derived from the lines of the program.

Topic assignment, linking to a project, joining a group, and assigning a tutor(s)

This process focuses on the research projects of the program, since the topic to be investigated must be fully or partially relevant to one of its tasks and aligned with the pecific research themes of the program. Furthermore, it must be developed under the supervision of a tutor (and co-tutor).

Building on the previous step, this stage conducts a detailed analysis of the potential of each line of research with the projects and faculty groups in order to undertake the doctoral training of a specific number of applicants. It is recommended that the balance of mentorships among faculty members be reviewed, as well as that this role be initiated for recent PhD graduates, in the role of co-mentor, alongside an experienced mentor. Similarly, the necessary presence of at least one mentor as a project researcher, alongside their doctoral candidate, be considered.

It is advisable to create one or more exchange spaces involving those involved, knowledgeable about the specifics of the research topics, as well as the formal dynamics of research projects, as regulated by the regulations established by CITMA. Each applicant must submit a proposal that provides elements for decision-making regarding admission. Based on our experience in the doctoral program in Educational Sciences, it is advisable to make this initial presentation of the proposal by research line, for subsequent analysis in a meeting of the doctoral committee. Other leading scientists from the faculty may be invited (with the presentation of the agreed-upon research topics, either by the line coordinators or the applicants themselves). The specifics of each case, the balance of mentoring, the possibility of inclusion in projects, among other issues, will be discussed.

Applicant's admission to the doctoral program

This action is carried out when the doctoral committee, once it has approved the selection of topics and the assignment of tutors, by projects, groups, and lines of research, submits each proposal (individual or group) to the Scientific Degree Committee of the authorized institution and the corresponding admission agreement is issued.

Enrollment becomes effective when the admitted applicant submits the required documentation for the program and the standardized forms and documents are prepared. The official confirmation of the applicant's admission to the doctoral program makes them a doctoral candidate. Once this initial stage is completed, the corresponding training phase will begin.

Stage 2. Doctoral training process

The objective of this stage is to develop the research skills that will enable the doctoral candidate to successfully complete a scientific degree in a specific area of knowledge, consistent with the program in which they have enrolled, by completing the activities outlined within the core components of the

program: theoretical and methodological training; scientific research; and thesis writing, pre-defense, and defense.

Preparation of the doctoral student's individual training plan

The timing of the development of the training plan is crucial to objectively completing the scientific degree, at the pace and scale of each doctoral student's unique needs. Based on current regulations in Cuba, as well as the characteristics of doctoral training programs, in our particular experience in the doctoral program in Educational Sciences, with a considerable number of doctoral students in each group, conducting an individual assessment prior to developing the individual training plan takes on significant value.

It is necessary, based on the activities and credit system of the program, to determine which requirements the doctoral student can demonstrate have previously met, supported by established documentation. Similarly, certifications are submitted to validate certain activities, as well as requests for proficiency exams, when necessary.

All activities carried out must be organized within a timeframe that does not exceed the program for which you have enrolled, with reasonable and staggered deadlines, taking into account the necessary precedence of some activities over others. It is recommended to integrate and/or combine activities from the three components to complement the development of theoretical, methodological, and research skills, while simultaneously drafting the thesis document and sharing the main results achieved. The assigned tutor(s) play a key role here, and may seek advice from the project leader, the research group's research team, and the doctoral program coordinator.

Presentation of the research design in the project and/or research group

The doctoral candidate, advised by their advisor(s), will conceive the first version of the research design, which includes the theoretical design, the methodological design, and other components. This design, which bears a particular stamp in the case of doctoral research, is not a copy of the research work in which they participate within the project, but there must be a relationship between the two, as well as between the results derived from them.

Development of the activities conceived in the theoretical-methodological training

Doctoral students can achieve and demonstrate mastery of the content established in this section of the program in a variety of ways. The program is responsible for analyzing the evidence presented by doctoral students and/or providing training opportunities that facilitate the granting of the corresponding credits.

Similarly, compliance with training requirements related to mastery of Social Problems of Science and Technology content and foreign languages must be monitored, including establishing collaborations with the responsible areas within or outside the institution.

In the case of credits awarded for mastery of specific content, according to the doctoral topics and the individual circumstances of the doctoral student, research projects and groups can be ideal spaces for this purpose.

Development of the activities conceived in the investigative training

In the current regulations, all the activities conceived here establish that they must be carried out by the doctoral student within the research project and group they are currently working on. No specific typology of activities is established, but rather the holding of collective and systematic scientific debates led by scientific leaders is proposed, for the presentation of the results of the scientific work carried out by the doctoral students and for the assessment of research progress.

The modalities used can vary, from traditional thesis workshops and research seminars to more innovative approaches using digital media and social networks. It should be noted that credits corresponding to the dissemination of results through scientific publications and presentations at events can be encouraged through the presentation of ideas and proposals, cross-fertilization by the PhD group, and other research-specific activities designed by the program can be used as optional credits, provided they meet the requirement that they enable the student to independently address and solve complex problems.

The idea is to turn each scientific session of the project and/or research group into an opportunity to assess the work done by the doctoral student, while making contributions to enhance their progress and actively engaging in the training of other doctoral students through collaborative work.

An important element is that, regardless of whether training is organized by lines, groups, and projects, these should not be considered closed spaces. On the contrary, systematic communication between the project, group, and research line leaders, represented in the Doctoral Committee and the program coordinator, ensures that when managing these activities, the scientific leaders, by mutual agreement, invite other specialists, experts in specific topics, even from other disciplines and areas of knowledge, to enrich and foster the interdisciplinary approach to research.

Development of the activities conceived in preparation for the writing of the thesis, pre-defense and defense

It is considered that, regardless of the fact that current regulations explicitly establish the start of activities with the presentation of the first version of the research results (initial thesis), it is recommended that, in addition to the oral presentation, a written presentation be requested, in accordance with established regulations. This contributes to progress in this component, the correction of the document, and the improvement of doctoral thesis writing skills. In this way, the quality of the doctoral student's communication of results, both orally and in writing, is encouraged.

One of the defining moments in doctoral training is the successful completion of the pre-defense. If the project is understood to be the fundamental stage of training, the composition of the committee for this exercise must take into account this group of PhDs who have participated in, evaluated, and collaborated on the work being defended. Therefore, it is recommended that the Doctoral Committee review the history of participation of PhDs within the groups that have led the scientific sessions, in order to inform the composition of the pre-defense committees, in addition to enriching them with external experts on the topics to diversify the analysis and contribute to the refinement of the thesis.

This stage of doctoral training concludes with the following: a positive opinion addressing the points made during the pre-defense; the editing of the theses required for the defense; the completion of the file documents; and the defense before a designated panel, with subsequent processing of the documentation and the granting of the scientific degree from the CNGC.

Systematic evaluation of compliance with investigative actions

The systematic evaluation of the doctoral student's completion of research activities, as outlined in the training plan, is carried out quarterly, semiannually, and annually by the tutor(s). The project leader is also responsible for evaluating the work, a process agreed upon by the team.

Stage 3. Postdoctoral training process

This stage aims to consolidate the skills acquired during the doctoral training process, which are reflected in the professional and personal development achieved by the doctor, as well as in the contributions they are able to make to social development. All of this will allow the project leader, the program coordinator, and their Academic Committee to assess the quality of the doctoral training management, carried out from the leading role of the research project, in conjunction with the structures of the area and the institution, and to make the appropriate adjustments and improvements.

This program contributes to the continuing education of doctors by training them to perform the duties inherent to their rank. Some of the activities carried out include:

- Generalization of the scientific results obtained in the research process.
- Presentation of the fundamental results of the research and its generalization to the Cuban Academy of Sciences and Technological Innovation awards.
- Dissemination of the results obtained in high-impact journals and scientific events.
- Integration of doctoral program faculty, performing the roles corresponding to doctoral training, with an emphasis on guiding doctoral students, as co-tutor and tutor.
- Management of projects, groups and lines of research.
- Advising and managing processes and institutions in the area of knowledge of your doctorate.

The methodological proposal for managing doctoral training, linked to scientific research, which leverages the potential of research projects as a fundamental training setting, is based on the best practices accumulated in the doctoral program in Educational Sciences and the research projects of the CECEPRI (Center for Educational Research) and the training units within the Faculties of Early Childhood Education and Junior High Education of the University of Pinar del Río. The legal framework harmonizes the regulations established by Resolution 3/2020 of the National Commission for Scientific Degrees of the Republic of Cuba and Resolution 287/2019 of the CITMA (Center for the Study of Science, Technology, and Innovation), which legislates the System of Programs and Projects in Science, Technology, and Innovation as a component of the country's Science, Technology, and Innovation System. The determined stages enable the implementation of the complex doctoral training process and its integration into research projects as fundamental training settings, filling a methodological gap given the lack of guidelines in this regard.

This conception of doctoral training in the research project as a fundamental training setting is in line with the most recent trends in this process at the international level, as it favors an appropriate context, as well as the fulfillment of important characteristics, ranging from a solid admissions process, interaction between a community of doctoral students and doctors with a multidisciplinary vision, and the pertinent connection among training, science, technology, and innovation.

In Cuba, experiences such as those of the Center for Educational Studies at the Central University of Las Villas, in doctoral training (Torres *et al.,* 2020), highlight the connection of doctoral students to research projects and their integration into the corresponding lines of research. These authors also report the verification of learning outcomes based on contributions to the tasks of the project to which the doctoral students belong; all of this, as part of the methodological strategy of the doctoral committee (Torres *et al.,* 2020). However, it is not apparent that the potential of the research project as a fundamental setting for doctoral training is being leveraged.

In the international context, in a comparative study of several universities, Rey (2021) found that the Doctorate in Education program at the University of Valencia establishes "the connection of students to the research groups of the Faculty and projects as a constitutive and necessary part of doctoral training and that all of this is duly regulated and protocolled" (p. 9). Meanwhile, the University of Tokyo and the Tecnológico de Monterrey mention the possibility for students to belong to research groups and be linked to projects led by professors. However, they do not consider it a mandatory activity, nor is there evidence of guidelines or statutes that regulate such participation (Rey, 2021, p. 6).

In Latin America, research such as that of Díaz-Villalba and Castelló (2024) highlights the limitations that still exist in the structuring of doctoral studies (see the case of Paraguay here):

> In Paraguay, the academic dynamic is far from the traditional model in which professors make time for research. This is because most universities are teaching-oriented, and a faculty member's salary is based primarily on their teaching hours, which reduces their availability for research, which in many cases is nonexistent. (…) This situation translates into incipient lines of research despite universities efforts to consolidate them. This is mainly due to the precarious situation in which they find themselves. teachers and the lack of financial resources allocated to funding research projects (pp. 79-80).

These authors themselves highlight that "A pending issue has to do with finding out to what extent the lines of research really have an active project agenda" (p. 80).

From another perspective, Mancovsky and Colombo (2022) highlight "the fundamental role that training spaces can have that encourage the testing of different ways of being and doing with writing, together with "others" in a similar situation to promote the collective construction of knowledge" (p. 107), a pedagogical practice that, in addition to socialization, encourages the development of academic skills.

These authors (Mancovsky & Colombo, 2022) in their research on the implementation of writing groups as a pedagogical device, focused on the shared task of reviewing drafts related to doctoral research, state that:

> (…) collaborative work around intellectual and textual production helps promote and establish new ways of approaching research that pave the way for the social construction of knowledge. In this sense, this training counteracts the individualistic, confrontational, and competitive logic often fostered by the institutional academic-scientific world. Genuine exchanges among writing group participants occur thanks to the consolidation of ties through review activities (p. 112).

The proposal put forward in this article is very much in line with the trend identified by Sanchidrián *et al.* (2021) in a research on doctorates in Education in Spain:

> In the conclusions regarding the supervisors and authors of doctoral theses, we consider some issues to be highly relevant. In the last two decades, professors are no longer the only ones who supervise doctoral theses, as the requirements for hiring and promoting faculty have changed, with the tendency to co-supervise a veteran and a new supervisor (p. 150).

Regarding the findings in the SWOT matrix regarding the demotivation of some doctoral training participants due to economic reasons, this confirms the results of Mendoza *et al.* (2021), who state that "Economic problems (…) are a cause of doctoral students dropping out" (p. 180); these are situations external to doctoral training and must be considered from the moment they are admitted to the program and throughout the entire training process.

The results obtained in doctoral training, with the research project as the fundamental setting, in the doctoral program in Educational Sciences at the University of Pinar del Río "Hermanos Saíz Montes de Oca", share the positions that favor the social construction of scientific knowledge and overcome other conceptions that place the project as an area for the management of science, without emphasizing its formative function.

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Conflict of interest

Authors declare no conflict of interests.

Authors' contribution

The authors participated in the design and writing of the article, in the search and analysis of the information contained in the consulted bibliography.