

## PRACTICAL AND THEORETICAL GUIDELINES FOR RESEARCH TRAINING IN THE POPULAR UNIVERSITY OF CESAR

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### ABSTRACT

The purpose of this research is to propose practical and theoretical guidelines for strengthening research training in the Popular University of Cesar, Valledupar. Research training is understood as the practical and theoretical process that leads to the initial development of skills and abilities that allow the students of each academic program to structure research competencies. To achieve this, a methodological framework identified with the discipline is necessary, as well as the use of multiple strategies that can facilitate the teaching-learning process, and the acquisition of practical knowledge, related to the real problems of their environment. A descriptive, applied, documentary and field research was therefore carried out. A population of 138 teachers and 18 academic programs were involved, using a document review matrix to gather the necessary information about groups, research seedbeds, lines of research and degree options; postgraduate training, intellectual production and registration in the CvLAC of teachers responsible for research training; and the research contents, academic credits, and strategies used by teachers. The matrixes were submitted to content validity process carried out by five experts, while the data analysis was performed through the content analysis. Some of the results obtained suggested that the academic programs of the University require improving the strategies used to promote research training such as groups, research seedbeds, lines of research and degree options; as well as strengthening the curricula, the strategies used and the teachers responsible for research training.

**Keywords:** research training, guidelines, academic programs, strategies



## INTRODUCTION

Research training involves the development of abilities for solving and critically analyzing problems, and not just the elaboration of conceptual topics related to research (MEN, 2013). However, many university programs only offer theoretical courses that lack strategic practices between teachers and students, with the aggravating factor of being considered as “fillers” in the curricula. This situation generates apathy in the students in regard to research courses, and this, in turn, prevents them from developing research skills. In this same sense, Von Arcken (2007) clarifies that research training, or “learning to investigate”, is more than just a content or topic: research courses cannot be developed as one more course dedicated to dissemination, to management of concepts and processes. It is an opportunity to implement active methods and participatory proposals, which implies that students must learn through actions and actively change their opinion. Peñaloza (2005) refers to research as part of the curriculum and, therefore, as a student's task. Although it has been given increasing value, it is often granted more verbal obeisance than effective consistency, or it leads to the exaggerated belief that all university learning can be achieved through researching. In fact, research must be present, but it is essential to establish its requirements and its limits, as well as its purpose. Thus, teachers are necessarily called to investigate, to widen the frontiers of knowledge and to incorporate new laws, principles, and theories into science, thus forming competencies or added value in future professionals (Peñaloza, 2005).

According to data from the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Economic Commission for Latin America and the Caribbean (ECLAC), the development of scientific research in Latin America is poor, and its results are not enough to achieve significant development. Latin American professors investigate very little, publications are brief and those that exist have content deficiencies (UNESCO, 2001). Likewise, the ECLAC (2012) states that the number of teachers who author scientific publications is scarce (Luque, Quintero & Villalobos, 2012). The situation in Colombia is not very different: University professors do little research, and their results and publications are not significant. Research in universities is limited only to the formulation and development of a final project, which is as a requirement to obtain a professional degree. This type of study is finally a heavy burden for students, which means that they assume an unfavorable attitude towards research, reflecting this in their scarce investigative production. In addition, the quality of these final projects is very low in terms of interpretive input, coherence and argumentation (Luque, Quintero & Villalobos, 2012). In addition, research training is only based on the transmission of knowledge about the methodological elements of research, leaving aside the ultimate goal of training students in research skills.



On the other hand, Jaik (2013) states that in many professional training programs some teachers lack the necessary tools, adequate knowledge, interest or research skills to encourage a group of students to research as part of their training, turning methodology courses into boring and complicated “filler” classes and losing the interest of students. This prevents the development of significant learning in students and constitutes a barrier that hinders the development of research skills. It is thus necessary that the teachers responsible of research courses have research skills and a great track record in training, which could facilitate achieving significant learning in students. Similarly, it is necessary to understand research as a continuous thought process of construction and reconstruction, that is, to teach to investigate by researching (Jaik, 2013).

Based on the above, it is proved necessary to carry out a study that could propose practical and theoretical guidelines to strengthen research training in the academic programs of the Popular University of Cesar. Thus, the following question arises: What would be the relevant practical and theoretical guidelines to strengthen research training at the Popular University of Cesar?

To solve this question, the following objectives have been set:

*Overall objective:* Propose practical and theoretical guidelines for research training in academic programs of the Popular University of Cesar of Valledupar.

*Specific objectives:*

1. Characterize the strategies, the academic training of human capital, and the micro-curricular content of research training in the Popular University of Cesar.
2. Define practical and theoretical guidelines according to the research training needs of the programs of the Popular University of Cesar.

To achieve these objectives, it is necessary to consider the definition of the variable “research training”, referenced by several authors:

Ortiz (2010) states that research training refers to the way in which the process that aims for students to achieve a solid research background has been visualized, constructed and established in a program. That is, it refers to the knowledge, skills, habits, attitudes and values that should be developed during the training process and to the way in which certain learning experiences can be incorporated into it. In this way, research training is more related to the quality of the environment in which it occurs than to the specific research topic.



In addition to the above, Jaik (2013) states that research training is essential for students because it allows managing, questioning and debating existing knowledge, developing new ways of understanding and conceiving reality, reflecting and being aware of the limits of knowledge. It also offers the necessary elements to decide from a theoretical and methodological position how to address research activity and academic debate with knowledge. In fact, since research is an eminently practical process, it is built around experiences related to specific research processes such as the realization of research projects. The development of research methodology courses, modules or others that “teach” how to investigate would be a failure if the theory is not accompanied by practice, so multiple scenarios must be created, as well as the necessary instances to do so (Jiménez, 2006).

This study is justified from different points of view because it addresses the following aspects: From the theoretical point of view, it is carried out with the purpose of offering some practical and theoretical guidelines to the existing knowledge as an instrument for strengthening research training in the academic programs of the Popular University of Cesar. From a practical point of view, it is convenient because there is a need to improve research training in the academic programs of the University, which can be achieved through the implementation of a set of general guidelines, taking into account the microcurricular contents, the strategies used to develop research training and the human capital responsible for it at the Popular University of Cesar. From a methodological point of view, this research is justified because the instrument for collecting information, created to characterize the strategies, human capital and microcurricula used in research training, has not been published before and will thus serve for the development of future research projects that aim to create strategies to help strengthen research training. From the social point of view, it is justified for it provides general guidelines that can strengthen research training in the academic body and students linked to the University's programs, which benefits the institution by showing its competitive advantages and adding value from intellectual capital in its academic and productive partner environment. The development of research projects with social impact directed by the graduates of the Popular University of Cesar will allow improving their job performance as they will obtain better research skills and will therefore be more competitive in the work field.

## MATERIALS AND METHODS

### *Design*

This research was quantitative, since data collection and analysis were used to answer its central question, giving priority to numerical measurement, to tallying and to the use of statistics, as a substantial essence of its argument (Hernández et al., 2014). Therefore, it is descriptive (Bavaresco de Prieto, 1992) because the data obtained will be described; of



transectional design because the data and the necessary information will be taken at a single time (Ávila, 2006); not experimental because the variable training in the research will not be manipulated by the researcher (Hernández et al., 2010); and is a field research because it collects the information through a document review matrix with the purpose of analyzing their relationships and incidents to propose practical and theoretical guidelines (Tamayo, 2003).

### *Participants*

The population of this study was formed by two groups, identified as population "A" and population "B", respectively. Population A was made up of 138 teachers responsible for research courses in 2017, according to the nature of the program. Population B was made up of the 18 professional training programs of the Popular University of Cesar.

### *Instruments*

To comply with the objectives of this research, a matrix or script was designed for the documentary review. It was used to collect the data of the research groups, research seedbeds, lines of research, degree options, as well as the information related to postgraduate training, intellectual production of teachers responsible for research training and registration in the CvLAC (Curriculum Vitae for Latin American and the Caribbean), content, academic credits and teaching strategies as units of analysis. Each of the matrices used was subjected to a content validation process carried out by five experts. This was a logical review of the instrument, which shows the specific domain of content to be measured (Hernández et al., 2006).

### *Procedures*

For the collection of information, it was necessary to review and gather the information present in the institutional documents belonging to the academic programs of the Popular University of Cesar under study, as well as in the resúmenes of the key informants and in the applications of COLCIENCIAS such as the CvLAC and the GrupLAC of the National System of Science, Technology, and Research. Likewise, for the data obtained in the documentary analysis matrices, the content analysis defined by Hurtado (2012) was used as the process that covers the location, collection, selection, review, analysis, and extraction of information present in written documents or digital, among others (Artiles et al., 2008), in order to interpret and theorize the data and information obtained. Cerda (1993) refers to content analysis as a technique used in the objective and systematic description of the manifest content of mass communication through a process of classification into categories.

## **RESULTS AND DISCUSSION**



### First specific objective

*Characterization of the strategies (research groups, research seedbeds, lines of research and degree options)*

Research groups were characterized based on the number of intellectual products with verifiable results and their categorization (COLCIENCIAS). Then, the strategic analysis of Serna (2016) was carried out, which states that, to evaluate the factors, or in this case the research groups, a matrix must be generated to assess the categories of the groups. The result of the categorization of the research groups was 2.12, which is below the average value (2.5).

Research seedbeds were characterized based on their scientific production. To do so, the research seedbeds taken into account were those that have been internally funded by the Popular University of Cesar, as well as the projects presented at the THE EXPO event held in 2015, 2016, 2017 and 2018, whose summaries and articles were published in an outreach magazine with ISSN entitled "Revista THE EXPO, Semilleros & Jóvenes investigadores"<sup>1</sup>. According to the analysis, it can be affirmed that the number of projects approved in internal calls for financing research seedbeds at the Popular University of Cesar is not significant compared to the number of research seedbeds endorsed by the University. Throughout 2011, only 23 projects of 118 seedbeds endorsed that year were approved, a figure that does not exceed 20% of the total seedbeds. Throughout 2013, only 28 projects of 118 seedbeds endorsed that year were approved, with a slight difference of five more projects since 2011 (first call for financing seedbed projects). And, throughout 2016, 38 projects were approved out of 119 seedbeds endorsed that year, a figure that does not exceed 20% of the total seedbeds, with a difference of ten more projects since 2013 (second call for financing seedbeds projects), minimum amount approved after three years elapsed (because the last call began in 2017). Also, the little research production of seedbeds is evident, as well as the inequality that exists between the academic faculties of the Popular University of Cesar regarding the research production, evidenced in THE EXPO events held in 2015, 2016, 2017 and 2018, whose summaries and articles were published in an outreach magazine with ISSN entitled "Revista THE EXPO, Semilleros & Jóvenes investigadores"<sup>2</sup>. The Faculty of Engineering and Technology has 34% of publications and is followed by the Faculty of Administrative, Accounting and Economic Sciences with 19% of publications. The Faculty of Fine Arts is in the last place with the lowest number of publications: 4%.

Another of the strategies of the programs that promotes research training is the lines of research. The program with the largest variety is the Bachelor's Degree in Mathematics and

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<sup>1</sup> "THE EXPO Magazine, seedbeds and young researchers"

<sup>2</sup> "THE EXPO Magazine, seedbeds and young researchers"



Physics, with a total of 39 different lines of research, which corresponds to 19.5% of the total lines of research of the University, followed by the Agroindustrial Engineering Program with 31 (15.5%). The programs with fewer lines of research were Economy, Electronic Engineering and International Trade, which do not exceed five.

Regarding the different options to obtain a degree, the academic faculty with the highest number of final papers is Engineering and Technology with 47%, followed by the Faculty of Health Sciences with 36%. These two Faculties have given the greatest contribution to the research activity of the University between 2015-2018, since the option of writing a paper or carrying out a research project has prevailed in its academic programs compared to the other degree modalities.

*Characterization of human capital (postgraduate training, intellectual production and registration in the CvLAC)*

According to the characterization of postgraduate training, the programs where the majority of teachers with Doctorate training are is Public Accountancy, which has seven teachers with a Ph.D., followed by the programs of Business Administration, International Trade, Environmental and Sanitary Engineering, the Bachelor's Degree in Mathematics and Physics, and Sociology, all of which have four teachers with a Ph.D. The programs that lack teachers with Doctorate training are Systems Engineering, Agroindustrial Engineering and the Bachelor of Natural Sciences and Environmental Education. As for those with a Master's degree, the programs with the largest number of teachers with this training are Nursing, with nine, and the Sociology program, with eight. Nonetheless, more than half of the programs only have one or two teachers with a Master's training. In the same way, the programs with the greatest number of specializations are the Nursing program, with eleven teachers, and the Agro-Industrial Engineering program, with four teachers. Also, in some programs there are still teachers who only have undergraduate training, such as one teacher in Business Administration, three in Nursing, two in the Bachelor of Arts and Folklore and one in Sociology.

Regarding the characterization of intellectual production, the academic programs with teachers who have the greatest intellectual and scientific production are Nursing, with 29; Business Administration, with 28; and Sociology and Environmental and Sanitary Engineering, with 24. The teachers of these four programs amount to 50% of the total intellectual production. The programs with teachers that have minimal intellectual production are Law and Microbiology, with 4 each.



At the Popular University of Cesar, there are 138 qualified teachers who take on the great responsibility of research training. They are distributed along academic programs according to the number of courses that their curricula have. 65% of these teachers are registered in the CvLAC, while 35% are not.

#### *Characterization of the microcurricula (contents, academic credits and teaching strategies)*

The characterization of the contents shows that the program with the highest number of research courses is Sociology, followed by the Bachelor of Arts and Folklore, Electronic Engineering and Business Administration. On the other hand, there are programs with few research courses in their curricula that do not have more than the three, such as the Bachelor of Mathematics and Physics and the Bachelor of Natural Sciences and Environmental Education.

Regarding the characterization of academic credits, the program with the highest number of credits in research is Sociology with a total of 37, followed by the Public Accounting program with 17, and the Electronic Engineering program with 16. The number of credits is directly related to the number of research courses. Therefore, in order to increase the number of research credits, it is necessary to increase the number of research training courses within the curricula of academic programs.

On the other hand, teachers of the academic programs of the Popular University of Cesar in charge of research training use strategies and methodologies with which they seek to develop research skills in students. However, taking into account Pepper's (2012) classification of the strategies, it can be deduced that 54% of them only inquire about the students' previous knowledge (10% of the strategies) and promote understanding through the organization of information (44% of the strategies), instead of actually developing research skills in students. Accordingly, the remaining 46% corresponds to the active methodologies used by teachers to contribute to the development of research skills in students. These methodologies can be generalized in: generative topic, simulation, projects, case studies, problem-based learning, on-site learning, ICT-based learning, service learning, tutoring research, cooperative learning, among others.

#### **Second specific objective**

According to the research training needs identified in the academic programs of the Popular University of Cesar, it is important to propose some practical and theoretical guidelines.

#### *Guidelines for strengthening the strategies used to enhance research training*



*Strategy 1: Investigation groups*

1. Supporting and increasing research groups according to the categorization of COLCIENCIAS
2. Increasing scientific production
3. Participating in annual internal calls for financing research projects
4. Developing national events involving research groups and the dissemination of their results (articles with ISSN, book or book chapter with ISBN)

*Strategy 2: Research seedbeds*

1. Socializing the Agreement 009 of July 2, 2010 to students in first academic semester
2. Developing an annual research training certification for research seedbeds
3. Promoting the active participation of seedbeds students and tutors in at least four national and international events and/or meetings
4. Constructing monitoring mechanisms for research seedbeds

*Strategy 3: Lines of research*

1. Presenting a formal and structured document according to a defined and unified model on the lines of research
2. Disseminating lines of research that the academic faculties have, as well as the professional training programs and research groups.
3. Carrying out research activities considering the lines of research as thematic or interdisciplinary axis

*Strategy 4: Degree options*

1. Research-oriented degree modalities
2. Undergraduate work with criteria of relevance, rigor and coherence

*Guidelines for human capital responsible for research training*

1. Using techniques that promote the development of research skills
2. Efficiently preparing, updating and training teachers
3. Registrating teachers in the CvLAC
4. Developing mechanisms for evaluating the academic production of teachers in charge of research training

*Microcurriculum guidelines and strategies used in research training*

1. Updating the curriculum with classroom projects for the achievement of research training
2. Including curriculum contents with pedagogical strategies that encourage research



3. Research training with generic and methodological skills
4. Implementing active methodologies
5. Increasing the number of research courses in the curricula

### Discussion

Taking as a reference the characterization of strategies used in research training, research groups of the academic programs of the Popular University of Cesar are not well categorized in COLCIENCIAS. Among the intellectual products that are not originating in the research groups and that prevent a good categorization in COLCIENCIAS are: intellectual production with significant contributions; technological development of maximum quality; dissemination of publications with high impact; social appropriation of knowledge concerning congresses, workshops, recognitions; participation in international networks; and training of new researchers.

In regard to research seedbeds, the number of projects approved by internal calls for financing research seedbed projects at the Popular University of Cesar is insignificant compared to the number of research seedbeds endorsed by the University. This leads to three aggravating situations: the small number of projects that are approved by internal calls against the large number of seedbeds endorsed by the University; the fact that not all seedbed programs submit proposals in internal calls for project financing; and the fact that, since not all present proposals, the active seedbeds are those which take advantage of the opportunity by presenting two or more proposals. In addition, the characterization of the seedbeds allowed to demonstrate the little research production and the inequality that exists between the academic faculties of the Popular University of Cesar regarding research production.

Accordingly, the academic programs of the University have a considerable amount of lines of research, distributed respectively by research groups. Many of these lines are only recorded in institutional documents as compliance with requirements, but they are not regarded or used as strategies to guide the methodological and organizational proposal of a study. Also, teachers and students lack the knowledge about which are the lines of research of the respective programs, which implies that, when developing an investigative proposal, they are imposed or that simply the most frequent ones are used, leaving aside lines that could be relevant for the development of research projects that seek to solve contextual and regional problems.

Some of the modalities for obtaining a professional degree are professional practices, seminars, diplomas, and research projects (generally papers). The latter is the least common option chosen by students due to the lack of minimum knowledge on the subject to be researched, demotivation regarding research or simply because carrying it out requires a long



time, therefore losing the opportunity to generate new knowledge or even other benefits that this activity entails.

Taking into account the characterization of human capital responsible for research training, it can be affirmed that teachers have the necessary training to carry out and guide academic and research processes in a specific area of knowledge and develop, strengthen or deepen generic and methodological skills during their pedagogical work. However, it is pertinent that the postgraduate training of the teacher responsible for research training has a Master's, Doctorate or Postdoctoral degree, since these programs expand and develop knowledge to solve disciplinary, interdisciplinary or professional problems in a deeper and more complete way. In addition, they provide the person with basic instruments that enable them as a researcher in a specific area of science or technology. Regarding their intellectual production, it can be said that, to date, 57% of teachers responsible for research training have produced a total of 46 publications in indexed journals, 36 books, 45 book chapters, 62 research and development projects, and cover 60 lines of research. On the other hand, 43% do not have any type of scientific production. This allows to confirm that a large part of the teachers in charge of research training do not have research skills since they are not immersed in scientific activity and, thus, do not have any type of intellectual production. Another important aspect is the registration of teachers in the CvLAC: the characterization of this indicator makes it possible to identify that the largest number of teachers registered in the CvLAC work in the programs of Business Administration, Nursing, Environmental and Sanitary Engineering, and Sociology. However, the total number of registered teachers does not reach the total number of teachers in each program, except for the Environmental and Sanitary Engineering program, where all 11 teachers who are in charge of research training are registered in the CvLAC. This is considered a weakness since if the curricula of the teachers are not registered or updated through the CvLAC, research groups and researchers could not be categorized according to their importance within the study and the its difficulty level.

Regarding the research content, due the concern about research training, all the programmatic contents of the different programs have been revised, socializing curricular activities and pedagogical strategies focused on compliance with the constructivist, contextual cognitive, pedagogical model which is handled at the University. The different academic curricula have been submitted to reforms in order to improve the teaching level of research subjects, seeking to increase the amount of research courses and training teachers in the resolution of problems from any approach. However, to date, the number of research courses and the application of strategies that lead to the development of research skills in students are still not enough. Accordingly, the type of methodologies and strategies used by teachers should be the following: generative topic, simulation, projects, case studies, problem-based learning, on-



site learning, learning based on ICT, learning through service, tutoring research, cooperative learning, among others. Nonetheless, the reality shows the opposite, as the amount of active methodologies implemented in research training courses is insignificant.

## CONCLUSIONS

The accreditation of undergraduate programs is constituted as the recognition of quality within the Higher Education System, both nationally and internationally, to the commensurate fulfillment of factors defined by the academic communities as indicators of high performance and of adequate professional training. In this way, research training is part of the research quality factor and is even considered an engine that drives undergraduate programs in each of its disciplines to achieve impacts on the new knowledge society that make universities visible in a local and globalized environment.

The strategies used by academic programs to promote research training should be strengthened through the support and increase of research groups and seedbeds according to the categorization of COLCIENCIAS, the increment in scientific production, the participation in internal calls, the construction of follow-up mechanisms for the fulfillment of objectives, the dissemination of research work generated in research training spaces before the scientific society in order to show the strengths of students as well as the results of lines of research relevant to socio-economic needs.

A curricular transformation with better teaching, pedagogy and didactic methods is necessary, aimed at training in research skills. In the micro-curricula, a theoretical and practical articulation must be reflected in research courses that focus on strengthening the training in and for research. Likewise, there should be didactic-pedagogical processes that allow students to explore inquiry strategies, identify problems, analyze contexts and propose possible solutions. Also, course plans used in research training must include pedagogical strategies and active methodologies with which students can develop research competencies.

The human capital responsible for the orientation or mediation of the research processes in the academic programs of the Popular University of Cesar must be professionals trained in research with obvious research skills. In addition, they must have scientific production and be active in the research activity.

Therefore, practical and theoretical guidelines are hereby suggested based on the research training needs of the academic programs of the Popular University of Cesar, to be included in the guidelines for the accreditation of undergraduate programs established by the National Accreditation Council in 2013 and in the Strategic Plan for Research Management 2017-



2020, in order to strengthen research in academic programs which allow achieving high quality accreditation.

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