

## The “Incubators” as Research Spaces for the Novice Researcher

### Los Semilleros como espacios de investigación para el investigador novel

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## Summary

This article of empirical and interpretive nature aims to offer a contribution to the discussion of “Incubators” as research spaces in the formation of the novice researcher. It is a product of reflections carried out by the authors on the subject and discussions carried out with undergraduate and graduate young people who aspire to be researchers in the field of education. It is based on a reference framework related to: a) research as a systematic process that is learned and taught and; b) competences in research for the training of novice researchers. It is based on the assumption that to do a research in the field of Education Sciences is complex. However, this makes them fertile and an incubator for research competences. It is concluded with the proposal of three actions or paths associated with the training of novice researchers: to) the institutionalization of “Incubators” as research spaces; (b) the production of scientific papers and; (c) the implementation of the curriculum research. The expectation of the authors is that these reflections contribute to promote educational institutions spaces such as the research “Incubators” allowing them to exceed the research gaps that currently exist in Latin America and that they consolidated as organizations that learn and manage knowledge.

**Keywords:** Competence-based Training; Learning, Research and Teaching.

## Resumen

Este artículo de carácter empírico e interpretativo tiene como objetivo ofrecer un aporte a la discusión de los Semilleros como espacios investigativos en la formación del investigador novel. Es producto de reflexiones realizadas por los autores sobre la temática y de las discusiones realizadas con jóvenes de pregrado y postgrado que aspiran ser investigadores en el campo de la educación. Se sustenta en un marco referencial relacionado con: a) la investigación como Proceso sistemático que se aprende y enseña y; b) Competencias en Investigación para la formación de los investigadores noveles. Parte del supuesto que investigar en el ámbito de las ciencias de la educación es complejo, sin embargo, ello las hace fértiles y un semillero para obtener competencias investigativas. Se concluye con la propuesta de tres acciones o caminos relacionados con la formación de investigadores noveles: a) la institucionalización de los semilleros como espacios investigativos; b) la producción de artículos científicos y; c) la articulación de la investigación con el currículo. La expectativa de los autores es que estas reflexiones contribuyan a promover en las instituciones educativas espacios, como los Semilleros de investigación, que permitan que estas superen las brechas investigativas que actualmente existen en Latinoamérica y se consoliden como organizaciones que aprenden y gestionan el conocimiento.

**Palabras clave:** Formación por competencias; aprendizaje; investigación, enseñanza.

## Introduction

Research training is a process that begins at the earliest levels of the education system. This can be seen in the various curricula: pre-school, primary, secondary and university education, where students are required to develop logical, critical and reflective thinking and to be capable of analyzing and solving problems in the social context in which they are immersed.

The above suggests a scenario that is worth achieving in education and decisive for having the highest levels of researchers today. However, the reality is different and shows a lack of research skills which has led many institutions to seek academic spaces to strengthen such skills.

We are aware of the need that Latin American educational institutions, especially university institutions, have for undergraduate and graduate students and teachers to generate and develop their knowledge. This has been decisive in organizing research incubators as a mechanism to complement the professional training of novice students.

Therefore, this discursive work aims at proposing institutional actions or paths for the training of novice researchers and the development of their competencies for the consolidation of mental structures and social appropriation of knowledge. This work is of an interpretative nature, based on the experience of the authors as research teachers and their active participation in the line of Research on Pedagogy that is developed in the Doctorate in Education of the "Libertador Experimental Pedagogical University", and in the dialogues and reflections conducted with undergraduate and graduate students on this subject.

The work was organized in five parts: the first one is an introduction, the second the problematic approach, the third a brief referential path, the fourth actions or paths for the training of new researchers and the fifth conclusive ideas. It ends with bibliographical references that support this work.

### **Problematic Approach**

Research has always been one of the most difficult areas to implement in universities. It is unquestionable that all the institutions have developed subjects on research methodology, workshops, programs and lines of research, whose main purpose is to motivate students in the research processes and to acquire the theoretical and practical elements on concepts, methods and techniques usually used in scientific research work. However, these objectives have been partially met because there are still limitations for students and their teachers to carry out research and learn to research through researching and developing competencies such as observation, inquiry, and critical thinking.

One problem, which derives from the previous approach, is that we lack a research culture. The research work only aims at complying with the requirement for the preparation of academic works aimed at the undergraduate degree, and theses for Masters and Doctorates. In the first, students are supposed to gain a research spirit and interest. However, this is not the case, despite the fact that there are very well-structured research components with subjects ranging from research methodology to different seminars that should ensure that students develop a critical mentality, interest in inquiry, ongoing questioning and the possibility of creating and recreating knowledge. However, experience shows that this activity, which should be recreational, motivational and introductory to research, often becomes an obstacle or a difficult task to achieve (Calderón, 2005).

The situation at postgraduate level is similar, with the only difference that, at this level, students are required to demonstrate methodological mastery (master's degree papers) and to produce knowledge or innovate (doctoral theses). Notwithstanding the foregoing, the reality is that most of these works are decontextualized and do not respond to the actual nuclear problems and are limited, in general, to the compliance with a requirement without a solid onto-epistemological foundation that goes beyond a descriptive work in order to achieve the understanding, explanation and interpretation of the object of study.

Another problematic point is the lack of training in research skills on the part of teachers, which means that students fail to understand the importance of epistemological pluralism to address the educational science facts. The Cartesian paradigm still persists in many teachers and does not take into account the complexity of realities, factors or events that intervene in research.

### **Referential Path**

This subject is very extensive; therefore, the following aspects will be discussed in a summarized way: a) research as a process that is learned and taught; b) research competences.

### ***Research as a Systematic Process that is learned and taught***

There are many research definitions given by different authors, including: Best (1983); AnderEgg (1995, 2005); Kerlinger (2002); Hernández, Fernández, Baptista (2006). All agree that research is an organized and systematized process that seeks to solve a problem, a situation or a specific event under rigorous scientific processes.

From this perspective, research can be learned and taught through the interrelation between theory and practice, which makes it easier for students to learn to research by researching and for teachers not to limit themselves to teaching or transmitting the contents, for example, of research methodology or its components, but also teaching the deductive and inductive processes that lead the institution to manage its knowledge.

Furthermore, an educational institution, especially the university, not only does science, but also teaches how to do it (Salvador Mata, 2009). The above-mentioned author suggests to the institution the need that its functions: teaching, research and extension, be integrated as a whole to contribute, through teaching-learning processes, to the search and social construction of knowledge.

In this context, research is learning. It is apprehending knowledge in order to produce ideas with clarity, linking them to each other, discovering hypotheses, developing strategies and finally, writing one's own ideas and research findings in such a way that others can read and judge them in order to progress towards the socialization of knowledge (Guido, 2012).

In this way, teaching and learning research becomes the transversal axis of the training process (Gallego and Rodríguez, 2015), since both terms are indissoluble processes, one depends on the other. Thus, in order to teach research, the teacher not only transmits knowledge but also manages it so that the student acquires the contents: declarative, procedural and attitudinal, interrelating them at all times with the research practice.

This implies that the teacher supports his/her actions in the classroom as an educational-critical or transformative practice. To do this, from the beginning he or she must rely on his/her experience and on the conviction that to teach research is not to transfer knowledge, but to create the possibilities for its production or construction (Guido, 2012).

If research is understood as a process of learning to teach, then it is important to mention the scope of the incubators as spaces or laboratories that bring together research, teaching and extension, which contribute to making the student the protagonist of his/her learning, responsible for building his/her own knowledge and acquiring the attitudes and aptitudes inherent in the exercise of research.

### ***Research Competences to Train Novice Researchers***

Competences have different meanings and connotations. It is a relatively new and complex polysemic term which deeply studied at present because the knowledge society has generated new orientations in the students' training process and in the reconsideration of the educational sciences' role, where competences are the fundamental axis for the comprehensive training of the individual and the development of the different types of knowledge: to be, to do, to know and to coexist.

The bibliographical references contain works by authors who have different conceptions about competences. We will mention some of them:

- Arguelles (1966, pp.23-95) says that they are “work actions or capacities to perform a job”;
- Fallows and Steven (2000, p. 8) associate them with the “cognitive abilities to understand and manipulate ideas and thoughts”;

- Le Boterf (2001, pp.100-110) refers to them as “actions combining various knowledge and resources”;
- Tobón (2004) considers them as skills that integrate knowing how to be, knowing how to do and knowing how to solve context problems,
- The Tuning Project (2007) considers that competences are the integration of knowledge such as “knowing – understanding”, “knowing – acting” and “knowing how to be”;
- Barriga y Hernández (2010, p. 376) refers to them as “the mobilization of the person's cognitive, emotional and social knowledge to make decisions, judgments, and to adopt points of view and commit to values”;
- The Mexican Educational Model (2016, pp. 46-47) defines them as the ability to “learn to learn”, “learn to think”, to question oneself about the diverse phenomena, their causes and consequences, as well as to evaluate what is learned in conjunction with others...”

From the foregoing approaches, it is evident that the term competence is multidimensional, and the specific use of the concept depends on the context and approaches on education, pedagogy, research, teaching, learning, etc.

Consequently, in this work, competence is assumed as the integration or mobilization of resources and conceptual, procedural and attitudinal capacities that an individual must possess to solve problems in different areas of personal, professional and social life, which guarantees a harmonious development in society.

Now, when referring to the training of research competences in education sciences, the subject becomes more complex not only due to its epistemology but also due to the method used, which is opposed to that of the exact sciences, (Rodríguez, 2005) which have been oriented under the positivist paradigm characterized by: methodological monism (there is unity of method and doctrinal homogeneity), causal explanation (hypothetical general laws), knowledge is based on logic, reason and empirical verification (Mardones, 1991).

On the other hand, the educational sciences seek the understanding and interpretation of events; therefore, the search is not intended for general laws but for particular facts in order to act rationally on them. In addition, the researcher is the object and subject of the research process, and, therefore, social phenomena are understood and interpreted from a comprehensive, complex and dynamic perspective.

From this perspective, in education, knowledge is generated from the contradictions found in the problems arising from the context. Work is done using the scientific method, but not under the logical-mathematical model but under the critical reason. This is because the society, object of study, is also subjective and the ultimate interest of science is emancipatory and transforming (Mardones 1999).

The onto-epistemological discussion in the educational sciences brings as consequence some difficulties for researching in this field, especially when they are novice researchers who are being trained and require solid bases on what it means to research in this science.

Rojas Soriano (1998) points out that in order to train a researcher, it is necessary for him/her to go through a process mediated by philosophical, epistemological, methodological and instrumental technical foundations that allow him/her to construct scientific knowledge in education and apply them through a transforming practice.

Research should be considered as a transversal axis in the curriculum of a given career, so that it goes beyond the limits of one discipline to be developed in all of them in an inter or multidisciplinary manner; thus overcoming the traditional fragmentation or reductionism of the curriculum.

Undoubtedly, research has an assigned curricular space in the educational institutions. It begins with research methodology and continues with the components of seminars leading to an academic degree. However, it is treated as a rote, informative, and decontextualized learning with little connection with the previous knowledge obtained in the career development, and with the practice that must be fundamental to learn how to conduct a research.

Research competence-based training is a process that begins at primary school level and continues through to undergraduate level and becomes consolidated at postgraduate level. The researcher is then trained through his/her research contributions in journals, participation in events, seminars, workshops, courses, research incubators, etc.

The foregoing is crucial for the development of the research competences, especially at present, because being a product of the information or knowledge society, they are considered to be the fundamental basis for the training of an integral professional regardless of his/her disciplinary area.

Similarly, Calderón (2005) states that researchers cannot be expected to be trained at the undergraduate level, but it is at this level when their attitudes and conceptual bases are formed. However, the reality is that a position of rejection and frustration is generated due to the difficulties in the pedagogical praxis, and in some elements of the hidden curriculum.

Undoubtedly, research competences can be reaffirmed and complemented with the incubators or institutional research lines since these are learning spaces or communities where the student is autonomous, independent, creative, innovative and responsible (Borja, Prada Londoño, et al, 2015).

### **Actions or Directions to follow on the Training Path for Novice Researchers**

This discussion is the product of the authors' experience as research professors and the conversations with undergraduate students in their undergraduate work process. As a result, the following actions or directions arose in order to guide the training path of novice researchers:

#### ***Institutionalization of the Research Incubators***

The institutionalization and creation of research incubators is an interesting option for the training of novice researchers. In order to do this, it has been considered the good experience they have had since their implementation in 1996, in the University of Antioquia (Colombia) until now, through the creation of the Colombian Network of Research Incubators (REDCOLSI for its Spanish initials).

This is a non-governmental organization, expression of a nationwide scientists' movement composed of students of higher and basic education organized in research incubators, which seek to strengthen the training process and scientific culture throughout the country.

From the foregoing, the authors consider that research incubators should be extended and institutionalized in all educational institutions, both in Latin America and in Colombia, due to their relevance in the training of novice researchers and the creation of learning communities composed of students and professors, who are known as researchers, in order to jointly develop projects that respond to the objectives of an institutional research line or to social projects of national and international scope.

In this way, the experience of the University of Santo Tomas in Colombia is shared, when it is stated that research incubators should be connected with the lines of research of the faculty or academic department, as well as with their curricular structure. In this way, the incubators should not depend on a teacher but on the faculty or department. It should be sought that the

incubators are persistent in time, without depending on the permanence of a specific teacher. (Universidad de Santo Tomas, 2017).

Consequently, the training of novice researchers must begin with the creation of incubators as collective research, which will allow students and teachers to "learn to research by researching" and thus manage, question and discuss about existing knowledge and ways of conceiving reality.

### ***Production of Scientific Articles***

This action derives from the previous approach, since through the research incubators, students work with teachers according to a project. Therefore, one of the competences to be developed is to write and report the partial or final results of a research activity. This ensures the transfer of knowledge to the society and contributes to the dissemination of the progress made in the research development.

This allows students, from the very beginning, to learn to strengthen their research process by participating in international or national events, conferences, symposiums where they have to present papers or notices. These meetings with other researchers in scientific communities guarantee the research learning.

The authors are convinced that an unpublished research is not a research. Therefore, students should be encouraged to publish their work, initially alongside research professors or other colleagues from the incubator.

The production of scientific articles also reaffirms the communicative and cognitive competences that are fundamental to the researcher's training while allowing them to search and process information through the use of technology (Rodríguez, y Martínez, 2003). This is a fundamental competence since the student not only resorts to the consultation of diverse sources, but also organizes, synthesizes and disseminates them. Thus, it is important to encourage students to publish in peer-reviewed or indexed journals.

At present, there are academic journals specialized in the production of scientific articles from incubators. Some of these journals located in Colombia are: *Semilleros de Investigación* and *Cultura investigativa*, which intend to motivate the academic writing of undergraduate and graduate students around research projects aimed at proposing alternative solutions to environmental problems.

### **Implementing Research in the Curriculum**

The curriculum development is the cornerstone of the whole training process of an institution and this is a process in permanent construction. Therefore, it is proposed to implement all the subjects in the research development, so that this is not a silo that includes a set of subjects or isolated curricular units, among them the research methodology, but on the contrary, that the research becomes the cross-cutting theme of the whole training process. This is because, from the beginning of the students' major or program, they integrate their expectation of a research project with all the curriculum subjects. This guarantees the research skills that are necessary to address the problem of reality with a theoretical and methodological position.

The implementation also proposes looking at the curriculum under the gaze of inter and transdisciplinarity, which requires that teachers work in teams and in a collaborative manner (Caurcel, García, Rodríguez and Romero, 2009) and have flexibility and reciprocity in the use of methodological strategies (Dipp, 2013).

This curricular conception entails the competence-based training in research and the development of knowledge structures by means of a complex, integral and reality-connected thought (Morin, 1996).

In this sense, Tobón (2012) states that, in order to facilitate the development of competences, it is necessary to implement, in all areas, activities of theoretical appropriation and application on problems, considering the professional, scientific, social and disciplinary context in order to determine from then on, the significant problems that guide the subjects' training.

## Conclusions

The subject discussion allowed analyzing and discussing about the training process of the novice researcher in education. It became evident it is not an easy path. Among other things, it is due to the paradigmatic difficulties of research in the educational sciences, a product of the limitations inherent to its object of study, which is complex and goes beyond its own observable empirical reality to penetrate other types of realities, which are particular and subjective, and influence the search for and solution of socio-educational problems.

On the other hand, the knowledge society generates changes and transformations which influence the training of research teachers and allow them, as stated by Friere (2011), to describe, inform, confront and reconstruct management and problem-solving processes in the different branches, both natural and humanistic, as well as assuming processes of reflection on action and developing as practical-reflective processes.

Furthermore, research training also depends on other factors such as the low value of knowledge, institutional political will, academic culture and teachers' poor training to teach to do research, and students training to have a positive attitude towards learning about research.

It is therefore observed that the training of a novice researcher is a gradual process that requires dedication, responsibility and commitment on the part of the entire academic community, and the integration of the curriculum with research, so that it becomes the cross-cutting element of the training process and maintains an inter and transdisciplinary approach.

Finally, some actions or paths are proposed for the individual's integral training and competence strengthening in research, which are: a) institutionalization of incubators as spaces for reflection and analysis; b) production of scientific articles; and c) approach to research as a transversal axis of the curriculum.

The above lines of action could be extended and complemented by different experiences and studies. Therefore, the authors leave the door open for other researchers to propose other actions. Actions such as the creation of research networks as instruments to generate cutting-edge scientific knowledge, and its implications in the solution of problems and transformation of society, and in the theoretical and methodological strengthening of research competences in education which, due to its complexity, requires different mechanisms to respond to the problems of the knowledge society.

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