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Reflections on the Training of Researchers in the Development of Educational Competences

Abstract

The training of researchers in the development of educational competencies is the central issue of this study. The process for research training is described. Training researchers in the development of educational competences is advocated and a profile of research skills developed. Training for research is different from training for the teaching profession. Researchers need diverse skills, and must be able to understand and tackle problems, as well as assimilating and generating new knowledge. Researchers must have skills that are logically linked. This integration of skills is made possible by a focus on competences, which can be thought of as a step forward in the development of the person, and as one of the best means that society has of preparing the researchers that are needed in the present day.

Keywords: training of researchers, educational competences, integration of skills, development, research process, components of competences

Introduction

In the globalized world of today, researchers need diverse competences, and must be able to understand and solve problems with multidisciplinary approaches, as well as assimilating and generating new knowledge. Researchers must go further and acquire skills that are logically interconnected. This integration is made possible by a focus on competences, which can be thought of as a step forward in the development of the person, and one of the best means for society to prepare the researchers that are needed for the present day.

Educational institutions must change in response to the need for competent researchers in various sectors of society. In this paper, the views of various authors about training researchers in the development of competences are analyzed and compared. The process of training a researcher in an environment that encourages the development of various educational skills is described.

Development

This new orientation changes the profile of the researcher, since he or she must carry out new administrative tasks, as employer or manager, which disrupts his or her training role with interns, assistants and postgraduate students. The orientation of the training is also different. Ibarra (2000) argues that new researchers should not be trained for academic practice but for research in different sectors of the economy. Their training should emphasize the cognitive and technical skills required for

posing and solving problems. Cabero (2001) states that the training of a researcher should develop certain abilities, skills, beliefs, values and attitudes that make up the personality of the student or of those who carry out these activities.

Training for research

To properly address the topic of training researchers in the development of skills, it is necessary to describe the concept of training researchers, based on the views of different authors, which are detailed below. Martínez (1999) argues that the training of a researcher cannot be reduced to a training in the scientific method or to a position that highlights the unique character of each object of study.

How should researchers be trained?

Research training consists of trainees' participation in an environment that encourages and requires constant research activity. Díaz-Barriga and Rigo (2000) argue that the researcher forms, establishes and maintains a permanent interaction with the object of his or her knowledge, explores and identifies the topic, develops the problem and defines the object of research, as soon as he or she assimilates and reconstructs the disciplinary meanings related to his or her area of expertise. During this journey, the research problem is transformed, as it is located as a fragment that is part of a larger problem, and for whose solution the efforts of an entire work team are combined.

Tamayo (2011) articulates the parts of a whole in which the product of research work acquires importance. The research process resizes the problem to the extent that it evaluates the scope of the research in which it is located.

Maggio (2012, p. 6) considers that "research training" can be used as a synonym for "teaching research", but prefers to use the term "training" because it implies not only the appropriation of knowledge, as in teaching, but also promotion of research competences, which is part of professionalization. It also has a mediating function that stimulates the transformation of the person in terms of their potential and capacities. Research training requires a different emphasis and must be supported by various procedures, oriented to the fundamental objective of the training. Training researchers is different from training for better performance in professional practice, or training teachers who will incorporate research as an aspect of their daily work.

The General Directorate of Higher Technological Education (2012) (Dirección General de Educación Superior Tecnológica) in their educational model for the twenty first century, mentions the necessary conditions for training researchers:

- The integration of a deep and objective knowledge of the contemporary problems in the professional field, regionally, nationally and internationally.
- The promotion of different modes of intelligence, as well as competences that align with world-class standards.
- Research as a way of creating knowledge that, due to its importance and timeliness, enriches the human heritage, and strengthens ties with its regional, national and international environment, with the ultimate purpose of improving living conditions.

- The development of capacities and abilities to acquire, analyze, interpret and handle information, generate knowledge, and identify, pose and solve problems, as well as make decisions.
- Improvement of the capacities and abilities for collegial work, in teams, in changing situations and in multicultural environments.
- The establishment of high-level human resources who are constantly updated and competent in oral and written communication, in at least two languages.

This list provides the identity of trainers in research, with a vision that aims to have a favorable impact on the whole person, for trainers and trainees alike, in every fibre of their being.

Definition of competence

Tobón (2001, p. 7) conceptualizes competences as an “ideal performance that emerges in a specific task, in a context with meaning. It is knowledge that is properly assimilated, so that it can be applied in a given situation, with such flexibility as to provide varied and relevant solutions”. Tobón and Fernández (2004, p. 4) state: “As an organizing principle of training, competence can be seen in the set of attitudes, knowledge and specific skills that make a person capable of carrying out a job or solving a particular problem”.

Components of competences

- Interpretation of information: Consists of understanding information, seeking to determine its complex self-referential meaning, to elaborate and re-work with a view to developing meta-understanding.
- Argumentation: Involves the creation of logical, symbolic and abstract systems of theories and concepts.
- Proposition: Consists of the generation of new conditions, beyond meaningful representation, with a foundation of a previous criterion.

Levels of complexity of competences

In the development of competencies, it is important to have criteria to assess the extent of their development. It is helpful to recognize different levels of complexity. Below is a proposed classification of competences designed by Tobón (2001), which indicates the significance and order levels of complexity:

- Level of routinization: The action arises from a routine, with self-correction, anticipation and flexibility. It is not the mere mechanical repetition of rules, but know-how.
- Significance level: The performance of tasks or problem solving is based on the construction of meaning, linking representational knowledge with procedural knowledge, through psychosocial and historical-cultural processes.
- Update level: The processes extend to other domains that were not initially in the scope of the competence.

- Level of experience: Understanding, assessing and approaching problems and particular contexts based on experience of many cases and assumptions, without the need to rely exclusively on pre-established rules.

Characteristics of the researcher in competence development

In order to describe the characteristics of the researcher that guide the development of competences, the views of various experts who conduct research are considered, in relation to the features that define the research process, including skills, conditions and competences. Developing research competences implies that these are integrated in the professional training process, consolidating abilities of observation, interrogation, recording field notes, experimentation, interpretation of information and writing about professional practice. It involves the ordering and systematization of the actions of researchers. Santos (2010) identifies the ability to write well as a key competence in the success of a researcher.

Litwin (2012) argues that there are competences that contribute to the growth of knowledge and the teaching of the research process, including:

- Competences related to professional and social behaviour, covering the decision-making and accountability essential to any investigation.
- Attitudes, especially work motivation, commitment to change, and consideration of the environment.
- Creative and ethical competences, and the ability to seek novel solutions at the same time as managing risk in an ethical way.

Santos (2010) considers that research on competences stimulates:

- Conceptualization and categorization of the context by developing theories or models.
- Identification of the principles and norms that govern research activity.
- Reporting, to the academic community and society, the concepts, ideas, reasons, descriptions and interpretations from different theories and disciplines that contribute to the research.
- Permanent construction of the organization of research, and the main modes of communication and interpretation between research groups and the wider academic community, thus promoting the visibility of research.

According to Tobón and Fernández (2004), researchers need to acquire practical skills, to understand what research should be, and to know how to know and know how to do. This would allow researchers to deepen their knowledge of a variety of situations as true researchers, whose competences lead to successful knowledge of society.

Moreno (2003) concludes that the skills can be classified in a “Profile of investigative skills” as follows:

- Skills of perception: sensitivity to phenomena, intuition, breadth of perception and selective perception.
- Instrumental skills: mastery of language: reading, writing, listening, speaking; mastery of basic cognitive operations: inference (induction, deduction, abduction), analysis, synthesis, interpretation; knowledge of how to observe and how to question.

- Thinking skills: ability to think critically, logically, reflectively, autonomously, and flexibly.
- Skills of conceptual construction: ability to absorb and reconstruct the ideas of others, generate ideas, order logically, expose and defend ideas, problematize, unravel and develop (build) an object of study and creatively synthesize concepts.
- Methodological skills: build the research method, use appropriate methods of knowledge construction, design research procedures and instruments, retrieve and / or generate information and handle and / or design techniques for the organization, and analysis of information.
- Teamwork skills: work in groups, collaborate in the construction of knowledge, communicate and disseminate knowledge.
- Meta-cognitive skills: relate to the object of knowledge, self-regulate the cognitive processes of knowledge production, question the actions intended to generate knowledge, evaluate approaches to the study and assess the consistency and validity of the products of research.

These skills enable the researcher to develop an understanding of the training of researchers in the development of educational competences, on the basis of their reflections and practice as research trainers.

Conclusions

The focus of research training on the development of competences is linked to methods of teaching research practice. Research training should be integrated in curricula at all levels of education. Early training should be incorporated into basic and secondary education, research should be a working tool in undergraduate study, and it should be a priority in postgraduate study, in order to develop research skills.

Litwin (2013) concludes that a new model of teaching and learning, which he calls “research incubators”, is required, especially for young students. These are conceived as a space to exercise freedom and academic criticism, creativity and innovation. An incubator not only generates knowledge for the improvement of systems, but also transfers and trains its members for the development of thought.

Research incubators allow students to participate of in the management of research projects of different kinds, and participate in the diagnosis of their social and environmental situation, strengthening their capacities for decision-making (Litwin, 2013).

Theoretical courses, methodological seminars and technical workshops are part of a comprehensive strategy for the acquisition of theoretical, methodological and technical skills and abilities. These must be articulated with each other, starting from the object of study, with research training as the central axis. Integration into college programmes should be considered, leaving individual and decontextualized work behind. The participation of researchers in the process responds to the needs of current settings. Researchers need different skills, and must be able to understanding and manage their skills, as well as assimilating and generating new knowledge.

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