Chapter 1
Training Educational Researchers in Science and Mathematics: A Case Study Through a Binational Workshop Mexico–UK

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ABSTRACT
This chapter presents a case study about the construction of knowledge that was generated through the project “Training directed to Researchers with Interest in Science and Mathematics Education”, where participating students had the experience of building knowledge by creating a research paper. The case presents theoretical conceptualizations of the construction of knowledge in doctoral programs students, contextual description of the project and its participants, the process of construction of knowledge by participating students through the workshop, the processes by participating teachers and the networking opportunities that arose from the project.

INTRODUCTION
Capability building in the areas of Science, Technology, Engineering and Mathematics (STEM) is a concern shared by international organizations. In this context, the Fund for International Cooperation in Science and Technology (FONCICYT) of the National Council of Science and Technology (CONACYT), in collaboration with the British Council, issued a call to apply for projects through the Researcher Link Program. This program’s aim was to link academic communities in Mexico and the United Kingdom (UK) to develop proposals aimed at developing skills for STEM.

In this environment, the project “Training directed to Researchers with Interest in Science and Mathematics Education” (No. 8 / II-E / 2014) was presented and approved. The project aimed to develop research abilities for mathematics and science education through the exchange of research among participants.
from Mexico and the United Kingdom, in order to promote skills in researchers with critical analytical skills and a proactive and international vision, as well as to support networks for research and innovation, to work on intellectual growth as a whole and to seek opportunities for research and publication.

The topic for the project was strategically selected by Mexican and British researchers as an opportunity to contribute to the human resources that work directly with learning environments in science and mathematics, in various educational sectors. Statistics about education in Mexico in these knowledge areas indicate very low levels of performance, hence the relevance of the training of doctoral students to investigate new possibilities.

The project was offered to science and mathematics doctoral students. A call for this training workshop was launched both in Mexico and the UK. The applications were evaluated by 11 research professors from both countries and finally 22 doctoral students were accepted to participate in the workshop.

The aim of this chapter is to frame this experience theoretically, contextually and empirically, in order to open the presentation of this book. The chapter considers the case of the knowledge construction project of the Mexico-UK bilateral workshop aimed at writing research documents, which are presented in this book.

LITERATURE REVIEW

The evolution of a society is achieved through the transformation of education. Carrying it out requires educational research with the purpose of improving teaching practices (Oliva, 2011). It is through the study of teaching practices, the creation of new knowledge and the development and communication of innovations, that these changes occur (Lopez, Sañudo & Maggi, 2013). The acquisition of research competencies that allow to contextualize and analyze a problem to propose innovative solutions is necessary (Fernández and Cardenas, 2014; Saldarriaga, 2016). Hence the importance of the training of researchers.

Training educational researchers involves scientific and technological processes to develop individuals with knowledge, methodologies and an attitude of social commitment to provide options for improvement. The Research Competencies Scale (RCS), developed by Swank and Lambie (2016) to evaluate the mastery of skills to identify gaps in the literature review, use of methodology, research ethics, and dissemination of results, is a tool that, although it is in the stage of validation, is useful for self-assessment on the level of research skills. The construction of knowledge through networks with intersection nodes to build collaboratively is highly valued to broaden the vision and impact of researchers (Ramírez-Montoya, 2012) and of technological knowledge management systems that will enable the nodes’ connection and the visibility of the scientific and academic production of doctoral programs (García-Holgado, García-Peñaavo & Rodríguez-Conde, 2015). In short, the challenges and possibilities in training doctoral students create endless possibilities for generating epistemological, scientific and technological knowledge.

A doctoral student has the ultimate challenge of presenting results of an investigation based on the discipline in which he or she specializes. Humphrey, Marshall and Leonardo (2012) found that an effective instruction in research increases the probability of presenting a thesis in the first four years from 15% to 70%. For Okech, Astramovich, Johnson, Hoskins and Rubel (2006), the fact that a student shows interest, commitment and quality in their work is closely related to the research training. Hence the importance of addressing research as a key element of the curriculum.