



## Article

# Literature review: continuing education of early childhood education teachers and science teaching

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### Abstract

This article presents the continuing education of Early Childhood Education teachers as a theme, focusing on Science Teaching. It starts from the understanding that the insertion of Science Education qualifies child development and points to the importance of continuing education that instigates the teacher to reflect on, about and for practice. To obtain the data, a qualitative review of the bibliographic type was carried out in theses and dissertations of the Brazilian Institute of Information in Science and Technology (Instituto Brasileiro de Informação em Ciência e Tecnologia - IBICT) with the descriptors: Continuing Teacher Education, Science Teaching and Early Childhood Education. The objective was to analyze what research has pointed out about the insertion of Science Teaching in spaces of continuing education. Thirteen papers were analyzed using Discursive Textual Analysis (DTA). In the analytical process, five intermediate categories and two final categories emerged: Continuing Teacher Education: Space for reflection and dialogue about knowledge and; Continuing Teacher Education and Public Policies. This article presents the metatext that was prepared for the first category. The results make it possible to affirm the need for continuing education to make it possible to understand the importance of science education for children's learning and development, and the inclusion of this theme in training spaces is essential.

**Keywords:** Child Development, Reflection, Pedagogical Practice.

### Introduction

The continuing education of teachers has been object of study in different researches (SCHNETZLER, 2000; ALARCÃO, 2010; IMBERNÓN, 2010; GÜLLICH, 2013; MALDANER, 2014) in a special way, in this article, the focus is on the Continuing Education of Teachers who work in Early Childhood Education with attention to Science Teaching. The goal is to broaden the understanding of this theme by analyzing theses and dissertations. It aims to identify what the researches have pointed out about Science Teaching in the

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spaces of continuing education of teachers who work in Early Childhood Education.

We start from the understanding that the continuing education of teachers in the school context is both a challenge and fundamental. In a special way, we point out that this formative process must provide opportunities for reflection in, on and for the practice with the objective of qualifying the pedagogical work of the teacher.

Reflective action is a process that involves more than the search for logical and rational solutions to problems, it involves intuition, emotion; it is not a set of techniques that can be packaged and taught to teachers. The search for the reflective teacher is the search for the balance between reflection and routine, between the act and the thought (SCHNETZLER, 2000, p. 25).

We understand that the reflective process needs to be planned continuously based on the reality of each school institution, with reference to the specificities of the educational stage in which teachers work, providing a space for dialogue, study and reflection on the needs of the group.

It is important that the group of teachers talk about their needs and challenges, that they constitute themselves as a collective in training, and for this, it is essential to provide an opportunity for training that includes reflective dialogue through theoretical mediation related to practice, because training through reflection

[...] is a way of operating in teacher education, which demands the collective, which starts from common desires, which is pertinent, more than necessary, because it is not instrumented alone, which must be mediated, because it does not take off, it does not take off, if it does not have impulses and theoretical mediation (GÜLLICH, 2013, p. 53).

Thus, for the realization of continuing education, we highlight the importance of conducting, mediating the process helping the teacher in understanding about the specificity of their work. When working in Early Childhood Education, for example, "it is important that every teacher understands it as a degree of training of new generations whose understanding requires studies and investigations" (MALDANER, 2014, p. 26).

We point out that the teacher presents "historical knowledge that needs to be signified for cultural recreation by new generations" (MALDANER, 2014, p. 18). And, to better understand such process, it is important that they participate in collective training spaces that promote a triple dialogue "with themselves, a dialogue with others including those who before us built knowledge that are references and the dialogue with the situation itself" (ALARCÃO, 2010, p. 49).

When considering teachers who work in Early Childhood Education, our gaze is directed towards Science Teaching. Varela (2020), when addressing the teaching of science at this level of education, points out that it is important to talk about experiences, with interesting science activities in order to create

opportunities for the construction of knowledge, exploration with children from everyday life with reference to the curriculum of each stage, theoretical and practical reflection. Also, in the process of teaching science, "the action of the adult is fundamental, through the challenges it poses to exploration and discovery" (VARELA, 2020, p. 15). That is, it is the teacher who encourages the child to question, to hypothesize, to build explanations for the phenomenon, which are fundamental to structure the child's thinking and action, providing opportunities for new learning and promoting development.

From this perspective, we understand that continuing education is an opportunity for teachers to build knowledge and to understand science as an important knowledge for child development. For it is at this level of education that the necessary basis for the formation of the subject is built and, thus, we understand that to start the process of Science Teaching is to provide an opportunity for the child to be inserted in the scientific culture from the curiosities, the hypothesis raising, the construction of arguments and the disclosure of the results based on aspects of the child's everyday life.

We start from the assumption that it is important to contemplate Science Teaching since Kindergarten, due to its importance to qualify the child's development. When we look at the documents that govern Early Childhood Education (BNCC, 2017), we realize that Science contents (we understand as Science, the Natural Sciences: astronomy, biology, chemistry, geology, meteorology, and physics) are part of the curriculum and generally permeate the fields of experience and learning objectives. Thus, it is essential that the teacher, who works in this teaching space, understands and identifies the specificities of science to provide children with challenging situations in the construction of scientific knowledge.

Thus, in order to qualify the education in Science, we believe in the need to provide significant experiences since Kindergarten, since:

science has become increasingly important in everyday life, mainly as a result of technological advances, so that adequate scientific training has become an indispensable requirement of the education of new generations (FUENTES, 2012, p. 10).

We emphasize that the child's development happens quickly, he builds habits, attitudes of everyday life, has curiosity, raises hypotheses, questions and develops through play. From a cultural-historical perspective, based on Leontiev (2001), play is the main activity of the child. Leontiev (2001, p. 68) calls activity, "the processes psychologically characterized by what the process, as a whole, is directed to (its object), always coinciding with the goal that stimulates the subject to perform this activity, that is, the motive. For the child, it is during the activity of playing that the most important changes occur in the child's psychic development. Therefore, the teacher needs to be aware of the direction of this play:

[...] it is fundamental that, as educators, we orient our actions to the formation of the men and women of tomorrow, in constant interaction with the environment from a scientific and technological reality. This is why science education must start in early childhood. On the one hand, it will favor the intellectual development and of equally important areas such as language

and mathematics. On the other, it will facilitate and encourage children's natural curiosity, leading to a true scientific interest

Also from the perspective of the cultural-historical framework (VIGOTSKI, 2000) we understand that child development is built through social interactions and the use of language in the construction of meanings and senses. Such specificities dialog with the National Curriculum Guidelines (NCG, 2009) for Early Childhood Education, which indicate that the learning situations take place through interaction and play. Thus, we indicate that the learning proposed by Science Teaching in Early Childhood Education should be present in play, manipulation, stimulating observation in order to qualify the children's understandings based on everyday life.

When a new word, linked to a certain meaning, is grasped by the child, its development is just beginning; at first it is a generalization of the most elementary type which, as the child develops, is replaced by generalizations of an increasingly higher type, the process culminating in the formation of true concepts (VIGOTSKI, 2000, p. 246).

This process requires "the development of a whole series of functions such as arbitrary attention, logical memory, abstraction, comparison, and discrimination" which are not possible to be simply memorized (VIGOTSKI, 2000, p. 246). Hence, it is up to the kindergarten teacher to initiate children in such processes, overcoming the simplistic assimilation and instigating the child to understand science. Maldaner (2014, p. 17) states that "science-school learning has a chance to happen if the historical knowledge of a science makes sense to the students and the teacher." Hence, we point to the importance of continuing education spaces that help in the preparation of the teacher to be able to insert Science Teaching in a more qualified way and to understand such knowledge as specific to their practice.

Professional knowledge consolidated through continuing education is based on the acquisition of both theoretical knowledge and skills for information processing, analysis, and critical reflection in, on, and during action, diagnosis, rational decision, process evaluation, and project reformulation (IMBERNÓN, 2010, p. 75).

In this direction, we point out the importance of understanding what research has indicated, that is, if there is a relationship between continuing education for teachers who work in Early Childhood Education and Science Teaching. A more detailed dialogue follows about the methodological aspects of the research.

## **Methodology**

The research is characterized as qualitative of bibliographic type (LÜDKE; ANDRÉ, 1986) and the study from the empirical data was related to the central research questions that aim to identify continuing education for teachers who work in Early Childhood Education and focus on Science Teaching.

The data were obtained through a bibliographic review of theses and dissertations published in the Brazilian Digital Library of Theses and Dissertations (BDLTD). The search was carried out using the following descriptors: Continuing Education of Teachers (title), Science Teaching and Early Childhood Education (all fields). We found forty-nine (49) papers, and the oldest was from 2006.

Initially, we read the titles and the abstracts. By the proximity of the theme, fourteen (14) works were selected, from which only thirteen (13) were analyzed using the Textual Discourse Analysis (TDA) (MORAES, GALIAZZI, 2006), because we could not access one work in its entirety. The thirteen (13) papers are identified in chart 1. The remaining papers were not selected, because in their thematic focus they presented other themes that were not close to our research.

Table 01: Papers selected for analysis

CODE	TITLE	AUTHOR	YEAR
T <sub>1</sub>	Science teaching in early childhood education from a cultural and scientific perspective: analysis of student-teachers' learning from the Continuing Education Program- University/Municipal Training	PELIZON, M. H.	2007
T <sub>2</sub>	Formative processes inside early childhood education institutions: from continuing education policies to teachers' experiences	ZAPELINI, C. A. E.	2007
T <sub>3</sub>	Formative needs and strategies for continuing teacher education: observation and analysis of a teacher training program	PIMENTA, J. I. P. B.	2007
T <sub>4</sub>	Continuing education for teachers at school: what is the place of childhood?	FLÖR, D. C.	2007
T <sub>5</sub>	Continuing education of early childhood education teachers: analysis of the production of theses and dissertations in the Southeast region (1996-2004).	SANTOS, R. A. D.	2008
T <sub>6</sub>	The conceptions of continuing teacher education in the context of policies for early childhood education from the 1990s	FLORIANI, A. C. B.	2008
T <sub>7</sub>	Continuing teacher education from a cultural-historical perspective: reflections from an experience in early childhood education	GAMBA, L. M. F.	2009
T <sub>8</sub>	The continuing education of teachers of early childhood education in Anápolis Goiânia-GO	OLIVEIRA, E. A.	2014
T <sub>9</sub>	Continuing education and teaching practice of natural science teachers in the early years of elementary school	SILVA, G.	2015
T <sub>10</sub>	Continuing education for teachers in the São Bernardo do Campo municipal network: experiences in the context of two pre-schools	BORGES, M. A. F.	2015
T <sub>11</sub>	An experience in continuing education: the role of the pedagogical coordinator and the reflective record in the training of early childhood education teachers	BARTHOLOMEU, F.	2016
T <sub>12</sub>	Challenges and possibilities for continued education of teachers of 4 and 5 year old children for scientific literacy in the Municipality of Amajari, Roraima	FIORETTI, E. C.	2018

T <sub>13</sub>	Teaching in Early Childhood Education: a proposal for continued education for teachers developed in a public school in the city of Medianeira (PR)	MARCO, M. T.	2019
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**Source:** Bourscheid e Wenzel (2020).

The works were analyzed in the light of TDA, looking for evidence of contributions and understandings about the continuing education of teachers who work in Early Childhood Education and its relations with Science Teaching. As for the analysis methodology, we point out that

[...] is described as a process that begins with a unitarization in which texts are separated into units of meaning. These units by themselves can generate other sets of units arising from the empirical interlocution, the theoretical interlocution, and the interpretations made by the researcher. In this movement of interpretation of the meaning attributed by the author, one exercises the appropriation of the words of other voices to better understand the text (MORAES, GALIAZZI, 2006, p. 118).

The analysis process was performed from the meanings constructed by reading the excerpts brushed from theses and dissertations, since "it is impossible to see without theory; it is impossible to read and interpret without it. Different theories make possible the different meanings of a text" (MORAES, 2003, p. 193). Every process required organization, openness to reconstruct knowledge, because "the researcher needs to understand that they are inherent to the process, part of the anguish of disorganization and chaos that precede the creation of new orders and understandings" (MORAES, GALIAZZI, 2006, p. 121).

According to the authors (2006), in TDA it is important to consider language as central, in addition to some steps for the realization of the study and analysis that is established as a qualitative method through the cycle of analysis deconstruction, communication and emergence. Each researcher organizes the work in his or her own way, either with the use of spreadsheets, software, colors, which help to express how the phenomena present themselves and, thus, better understand them, to then build meanings from a set of texts that form the corpus of the research.

In the initial process of deconstruction, according to Moraes and Galiazzi (2006, p. 123), occurs the "[...] unitarization, fragmentation, codification and attribution of titles to elementary units of meaning built from an intense reading and impregnation with the material of analysis." This process was accomplished by fragmenting the objectives and purposes of the papers, and with that, we coded each Unit of Meaning (US). According to the authors (2006):

It is important to know how to live with this moment of disorganization in order to allow the emergence of the new. It is in the space between chaos and order, between disorganization and categorization, that new and creative interpretations and understandings emerge. Productive writing implies abandoning oneself in the disorganized space of unconsciousness. The

process as a whole corresponds to a set of self-organized movements (MORAES, GALIAZZI, 2006, p. 126).

The ideas of the US carry countless possibilities of organization among themselves and the researcher, from his knowledge, will outline new associations consistent with the objective of the study, through groupings of similar ones. The US are grouped into categories by the proximity of meanings, and new perspectives begin to be outlined, with the creation of their own definitions. Thus, the process of creating new categories culminated in initial, intermediate and final categories.

As already expressed, qualitative textual analysis can be characterized as a methodology in which, from a set of texts or documents, a metatext is produced, describing and interpreting senses and meanings that the analyst constructs or elaborates from the referred corpus (MORAES, 2003, p. 202).

In the analytical process performed, the metatext was elaborated from one of the final categories and, according to Moraes (2003, p. 201), it represents, at the same time, the distancing from them, as the researcher author seeks to make a category clearer to himself: the construction "of a new text, a metatext that has its origin in the original texts, expressing a look of the researcher about the meanings and senses perceived in these texts". In the construction of the metatext(s), some of the US are cited to strengthen the arguments developed, forming a set of arguments that express our understanding in relation to the corpus of the analysis.

Thus, in the research carried out, the data analysis occurred, initially, by the deconstruction of the research corpus and it was possible to evidence several aspects, according to the context and the objectives and purposes of the continuing education presented in the works. The texts of the objectives and purposes were coded in twenty-five (25) US. Considering the terms, the most recurrent themes in these US, fifteen (15) categories emerged initially, which were regrouped into five (5) intermediate categories, culminating in two (2) final categories, as shown in Chart 02, below:

Table 02: Meaning Units and Emerging Categories

US Code*	Intermediate Categories	Final Categories
US1 <sub>T1F1</sub> , US3 <sub>T1O3</sub> , US16 <sub>T7O2</sub> , US16 <sub>T7O3</sub> , US19 <sub>T8F</sub> US20 <sub>T9F1</sub> , US23 <sub>T12F</sub>	Science Teaching and Scientific Knowledge in continuing education.	Continuing Education for Teachers: Space for reflection and dialogue about knowledge
US8 <sub>T3F1</sub> , US9 <sub>T4O</sub> , US11 <sub>T5O</sub> , US12 <sub>T5F</sub> , US14 <sub>T7O1</sub> US24 <sub>T13O</sub>	Professional teaching knowledge and the human development of the child.	
US4 <sub>T2F1</sub> , US6 <sub>T2O2</sub> , US10 <sub>T4F</sub> , US15 <sub>T7O2</sub> , US23 <sub>T11O2</sub>	Ongoing and in-service training.	
US7 <sub>T3O1</sub> , US21 <sub>T10F</sub> , US 22 <sub>T11O</sub> ,	Study, collective construction, reflection, recording, and teaching need.	

US5 <sub>T2O1</sub> , US13 <sub>T6F1</sub> , US17 <sub>T8O1</sub> , US 18 <sub>T8F1</sub>	Training policy, teachers' rights, legal documents.	Continuing Education and Public Policies
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**Source:** Bourscheid e Wenzel (2020).

\*This code represents the coding used in the analytical process, each US is enumerated and the abbreviation T indicates the Work (regardless if Thesis or Dissertation), the letter O indicates whether the US has been brushed off from the objective, the letter F indicates aspects of the purpose of the work and the number identifies the work in table 1 and the respective US of each excerpt.

Here follows an explanation of the two final categories, bringing some US for dialog.

a) Continuing teacher education: Space for reflection and dialogue about knowledge.

As shown in Table 02, this category emerged from four intermediate categories and 21 US, some of which are shown below as examples.

[...] the training process goes far beyond sensitizing and informing, and should expand the expressive possibilities and the level of knowledge of professionals, through a permanent and articulated process (US4<sub>T2F1</sub> ZAPELINI, 2007, p. 26).

[...] develop and implement training plans that meet the emerging needs of their teachers and the educational process itself (US7<sub>T3O1</sub>, PIMENTA, 2007, p. 30).

[...] continued training, carried out with theoretical and methodological subsidies grounded in specifics of teaching in Early Childhood Education, (US24<sub>T13O1</sub>, MARCO, 2019, p. 8).

[...] proposal of Science Teaching based on a perspective of recovery of the nature of scientific knowledge in a global, non-fragmented, non-specialized view of knowledge, integrating various aspects of both cognition and emotion (US1<sub>T1F1</sub>, PELIZON, 2007, p. 14).

This category indicates that continuing education needs to be prioritized in the school space, providing teachers with the opportunity to reflect on theory and share experiences in order to promote professional development and the qualification of their teaching practice.

Teacher education can play an important role in shaping a "new" teaching professionalism by stimulating the emergence of a professional culture within teachers and an organizational culture within schools (NÓVOA, 1991, p. 12).

From this category, it was possible to highlight the importance of organizing continuing education for teachers as a basis for the construction of knowledge that contributes to the understanding of the challenges of everyday life through collaboration, for the construction of learning in their training. And, in a special way, for the specificities of the knowledge of teaching for the teacher



who works in Children Education, contemplating both aspects of Science Teaching and child development.

#### b) Continuing Education and Public Policies

This category emerged from a single intermediate category and four US (as shown in Chart 02). The themes that are inserted in such category indicate, for example,

[...] analyze the public policies of continuing education for professionals in Early Childhood Education (US17<sub>T8O1</sub>, OLIVEIRA, 2014, p. 8).

[...] the implementation of the training policy in the municipality [...] (US5<sub>T2O1</sub> ZAPELINI, 2007, p. 14).

[...] conceptions of continuing education of Early Childhood Education teachers within the scope of the policy documents for this stage of Basic Education (US13<sub>T6F1</sub>, FLORIANI, 2008, p. 13).

For Nóvoa (1995, p. 28), the "professional development of teachers has to be articulated with schools and their projects". We consider it important that in continuing education, besides theoretical and practical knowledge, it is important to consider the legislation that deals with it, to ensure both its quality and the right to training.

Professional knowledge presupposes a specific training and allows autonomous teaching. It portrays the acquisition of knowledge that gives meaning and sense to professional practice carried out in the school environment. The knowledge of the area, the stage and the curricular component are at the core of the competence (BRASIL, 2019, p. 16).

Continuing education can provide opportunities for the exchange of experiences and the construction of knowledge and, thus, contribute to improving the quality of education. We understand that teacher training is an important space for dialogue, reflection and exchange of experiences, which, according to Imbérnon (2011), helps to build an investigative and reflective professional. In particular, we identified, in the analysis carried out, the need for the implementation of training spaces that promote, to the teacher who works in Early Childhood Education, both the construction of knowledge related to the specificity of the child, as well as a better understanding about Science Teaching.

Teaching practice is the continuous association between the object of knowledge and the object of teaching. The concomitance between the learning of the objects of knowledge and the learning of procedures and objectives seeks to select, order, organize and evaluate the objects of teaching that are a fundamental part of training and the permanent relationship between knowledge and practice (BRASIL, 2019, p. 16).

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### **Continuing education for teachers: space for reflection and dialogue about knowledge**

In the current context, the continuing education of teachers, besides being important, is a necessity, since continuous learning is essential in the teacher's profession, and the knowledge built is part of their practice with the theories studied during training.

This profession needs to be told and told: it is a way of understanding in all its human and scientific complexity. Being a teacher requires constant choices that cross our way of being with our way of teaching, and that unveil in our way of teaching our way of being (NÓVOA, 1992, p. 10).

In this study, we identified the need for the implementation of training spaces that promote the construction of knowledge by the teacher related to the specificity of the child integrated to Science Teaching and that are fundamental for the development of the child through teaching activities planned and conducted by the teacher.

To elaborate the metatext, we chose the category continuing education for teachers: a space for reflection and dialogue about knowledge. In the analysis process, some strong points emerged, such as the issue of reflection in, on and for the practice; the issue of the specific knowledge of the teacher who works in Early Childhood Education, more specifically about the child and its development and, also, about the need to work in the context of continuing education the scientific knowledge.

Considering the specific knowledge of the Early Childhood Education teacher, an indication that emerged was the limitation of the teacher's knowledge about the specifics of Science, because, as indicated in US20T9F1:

teachers have a precarious initial training to teach science classes, so they should improve their practice by participating in continuing education courses, and that preferably this occurs in service (SILVA, 2015, p. 20).

In this direction, Varela (2020, p. 1) points out that "[...] the insecurity of educators in relation to science has limited and impoverished children's learning opportunities". Considering the context of the initial training of teachers who work in Early Childhood Education, it is possible to point out that the training prioritizes literacy and the construction of basic notions of mathematics. Therefore, it is important to insert dialogues about the knowledge of science in the context of continuing education.

Starting from the understanding that the learning proposed by Science Teaching in the context of Early Childhood Education is present in playing, manipulation, observation, questioning, interpretation and elaboration of understandings from everyday life, the teacher needs to understand these

phenomena under the view of Science to provide children with challenging situations of knowledge construction, based on the knowledge of Science. Still, considering child development, it is important to ally Science Teaching with some specifically human capacities.

The processes of attention, memory, speech, perception, imagination and creation, in order to develop, need the teacher to work beyond the observable and perceptible concrete. [...]. The teacher must stimulate the child to see a broader horizon (ARCE, SILVA, VAROTTO, 2011, p. 70).

In this sense, it is important the teacher's understanding about Science Teaching, so that he/she can value the child's context in order to direct the construction of scientific knowledge and the understanding of the world enhancing the child's development. For this, it is essential that such dialogues are contemplated in the training spaces of teachers who work in Early Childhood Education.

For Nóvoa (2017, p. 1116), "it is necessary that all training be influenced by the professional dimension, not in a technical or applied sense, but in the projection of teaching as a profession based on knowledge. With that, there is, as explained, a need for continued training to contemplate a dialogue about Science Teaching and its re-signification to have a teaching "[...] with a more global vision of scientific knowledge" as pointed out by Silva (2007, p.14) in US1T1F1. In this direction, we indicate that it is important:

(...) foster, from the earliest age, the ability to observe, question, compare and justify, to establish, from what is lived, observed and experienced, levels of knowledge, provisional but sustained, that will gradually build the conceptual, analytical and structuring architecture that makes humans thinking beings, able to think scientifically about reality, i.e., to interpret it with foundation and question it with relevance (REIS, 2008, p. 10).

We understand that the Early Childhood Education stage is important to start Science Teaching, since at this stage the child is spontaneous and curious, and raises hypotheses. These issues are allies in the construction of the child's knowledge in the context of scientific culture. Bringing the dialogue about such teaching into the context of continuing education helps the teacher who works in Early Childhood Education, in the identification and choice of approaches that direct the look to aspects of Science, so that the child is being introduced to this understanding of the world. And so,

The educator, at this stage, is characterized as a mediator in the teaching-learning process: he needs to listen and feel the children, what they think, observe what they play and how they play, their conceptions, their development, because at this stage the formation of the sensitive human being begins, a base of values, which will provide them the search and the will to learn, but also to be (PIETROBON, 2010, p. 19).

Thus, we point out that the quality of the teacher's pedagogical work related to the insertion of Science Teaching in Early Childhood Education requires an understanding of how such teaching can contribute to the

development of the child and, therefore, the insertion of training spaces that encourage planning, collective and collaborative actions are of fundamental importance. Nóvoa (2009) and Imbérnon (2000) emphasize that the collaboration, that the group organization with the joint search for solutions to teaching problems promotes the continued learning of these professionals. And, a possible path for this may be the insertion of Action Research (AI) in the continuing education of teachers.

Thus, we propose the realization of training spaces with the insertion of the training model that considers the knowledge of the teacher's practice, mediated by theoretical reflection in a collaborative and interactive environment as an indication of possibility to qualify the Science Teaching in the context of Early Childhood Education.

The notion of reflective teacher is based on the awareness of the capacity for thought and reflection that characterizes the human being as creative and not as a mere reproducer of ideas and practices that are external to him/her. Central to this conceptualization is the notion of the professional as a person who, in professional situations, often uncertain and unpredictable, acts in an intelligent and flexible, situated and reactive way (ALARCÃO, 2011, p. 44).

We point out that the continuing education of teachers, besides being important, is a necessity, since the continuous learning is essential in the teacher's profession, and the knowledge built enables other understandings of the practice, such movement is constitutive of the profession. The relationship between theory and practice needs to be constantly reconstructed in a collective process of exchanging experiences and studies about teaching. According to Alarcão (1996, p. 179), it is important that teachers "reflect on their professional experience, their educational performance, their mechanisms of action, their praxis or, in other words, reflect on the fundamentals that lead them to act in a certain way.

This profession needs to be told and told: it is a way of understanding in all its human and scientific complexity. Being a teacher requires constant choices that cross our way of being with our way of teaching, and that unveil in our way of teaching our way of being (NÓVOA, 1992, p. 10).

Also, from practice, teachers build "knowledge about professional development and the investigation of practices for the production/ re-signification of knowledge" (GÜLLICH, 2013, p. 226). In this sense, the mediated, conducted training shows to be important in the pedagogical practice of the teacher, as well as, assists in the understanding about the specificity of their work.

[...] it is certain that professional competence implies a knowledge situated in the holistic, creative, personal, constructed action, a knowledge that depends, among other things, on the professional's ability to appreciate the value of his decisions and the consequences that result from them (ALARCÃO, 1996, p. 18-19).

The teacher's knowledge was one of the highlights in different US, for example, by the use of the term: "professional knowledge" (US9<sub>T40</sub>, US11<sub>T50</sub>, US12<sub>T5F</sub>, US24<sub>T130</sub>). And, especially, in US14<sub>T701</sub> there is an indication of the importance of the teacher understanding the "human development of the child" in order to qualify his/her understanding of learning modes. This aspect portrays the need for the teacher to plan teaching situations in which children are encouraged to participate, ask, and raise hypotheses in order to provide opportunities for learning.

Learning is one of the main sources of the schoolchild's concepts, and it is also a powerful force that directs his development, determining the destiny of his entire mental development (VIGOTSKI, 1993, p. 74).

Thus, considering child development based on language and interaction with the other and the environment, it is important to note that, for Vygotsky (2000, p. 334), "good teaching is that which leads to development, acting on what is not yet formed in the child, teaching should advance development. In this teaching context, the teacher's mediation is important, for he/she is the one who creates the conditions that enable child development.

Thus, we point out that the insertion of Science Teaching in Early Childhood Education imposes on the teacher the challenge that it is necessary to lead children to establish the necessary relationships between everyday life and the aspects of Science so that, in fact, they are initiated in the understanding of Science. For this, it is important the careful planning of the teacher because,

[...] the planning of learning by which children are exposed to scientific phenomena in a constant and controlled way, can help them to better organize their experiences and prepare them for the understanding of future scientific concepts that will be learned in formal education (ARCE, SILVA, VAROTTO, 2011, p. 63).

And still when contemplating some aspect of everyday life, it is essential that the teacher leads the child's look "in order to enable the understanding of observable phenomena, transforming the elementary knowledge into more elaborate knowledge" with that, the importance of systematic conduction, the teacher's attention to the direction, for a closer dialogue of science (ARCE, SILVA, VAROTTO, 2011, p. 66).

So to initiate the children in this understanding of Science it is necessary to propose learning situations, that stimulate their interests and that make possible their insertion in the context of science as cultural production.

Science classes should enable students to problematize and investigate phenomena linked to their daily lives, so that they are able to master and use the knowledge built in the different spheres of their lives seeking practical benefits for people, society and the environment (LIRA, 2012. p. 5).

This process of knowledge construction, the understanding of Science demands that the Early Childhood Education teacher studies and reflects about this knowledge, that has the opportunity to dialogue with their peers in training

spaces that help them to plan and better understand their practice with a look to Science, in a constant training process that provides "a reflective teacher in a reflective community" (ALARCÃO, 2011, p. 34). This was also indicated in US4T2F1 when Zapelini (2007, p. 26) points out that "[...] the formation process goes far beyond sensitizing and informing and should expand the expressive possibilities and level of knowledge of professionals." Thus, we believe in the potentiality of a collective training that contemplates the specificity of teaching with attention to the knowledge of Science as a propellant for the insertion of Science Teaching in Early Childhood Education.

## Conclusion

The study provided the opportunity to build knowledge about some processes of continuing education for teachers working in Early Childhood Education with evidence of gaps and potentials. We still observed that, even though the current legislation treats it as a right and a guarantee, in practice there are many challenges and difficulties regarding the planning of actions that make continuing education possible, due to the lack of knowledge and priority in meeting the legislation.

In relation to the training that covers Science Teaching in Early Childhood Education, the need is even more evident, since the teachers who work at this stage did not have the opportunity to study with much intensity during their initial training. And, in general, in the search we carried out, the reading of the papers indicated some perspectives of dialogue regarding the continued training of teachers, such as: training policy; legal and theoretical documents; teacher's knowledge; pedagogical practices, all themes being of great relevance to the educational field, but we observed few papers with emphasis on Science Teaching in Early Childhood Education. This reinforces the need for research on this topic.

In the process of analysis via TDA, we indicated in the final category that one of the difficulties that teachers who work in Early Childhood Education have in working with Science is due to the gaps since their Initial Training, which is focused on literacy and mathematics teaching to the detriment of Science knowledge. Thus, the challenge for the teacher is to observe and create learning situations that include the knowledge of science and that encourage children's curiosity, the formulation of questions, the search for answers, inserting them in the scientific culture in order to contribute to child development through the learning of science.

To this end, we indicate as a possibility the continuing education that enables teachers to study, reflect, and understand more about the importance of Science Teaching. Such space needs to be understood as an opportunity for collective construction that opens up possibilities of understanding and valuing the teaching practice in a movement of (re)thinking about the knowledge of Science as a way to qualify learning and child development.

In this way, we understand continuing education as an important space to study and reflect with the collective of teachers and we indicate that one way to accomplish such movement is through the process of Research Training Action (GULLICH, 2013), which contemplates the reflection and investigation of

the teacher's pedagogical practice, in a collective process through the socialization of experiences of practice with peers, combined with theoretical study.

And we indicate that the process of Research Training Action, in which the teacher is the researcher of his practice, in addition to qualifying his practice, the understandings about the importance of Science Teaching from the earliest age, collaborates both for child development and for continuing education and teacher constitution.

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