



Research in education in cyberculture: teacher training for / in complexity

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ABSTRACT. This text is the result of one of the collaborative researches, related to teacher training, developed in partnership with Basic Education teachers who participated in an Umbrella project, carried out in the period from 2014 to 2019, by the research group that we coordinate, within the scope of programs *stricto sensu* graduate courses from universities in Brazil and Colombia. Based on the epistemology of complexity, it aims to reflect on the training of teachers to work in the context of cyberculture, consisting of technological and linguistic complexities, and characterized by the multiliteracies that weave the citizen life of teachers and students. Collaborative research was adopted, in this study, as an educational and scientific methodology and principle, of political-educational quality, and Discursive Textual Analysis was the basis for the analysis and interpretation of data. The results obtained, from a semi-structured interview, carried out between February and May 2019, with six teacher educators, working in Higher Education and / or in Basic Education, lead to the conclusion that teacher training needs to articulate the pedagogical, political and cultural for teaching in a school routine marked by uncertainties and conflicts that take place in the social, science and technology fields; the diversity of culture and languages; by the polyphony of conflicts that impels the teacher to understand the meaning and the social place of the school. This reality challenges the teacher to train for the problematization, coping and collective overcoming of challenging situations, among them, that of educating in the context of complexity that manifests itself daily in cyberculture.

Keywords: digital culture; teacher training; epistemology of complexity; collaborative research.

Pesquisa em educação na cibercultura: formação docente para a/na complexidade

RESUMO. Este texto resulta de uma das pesquisas colaborativas, referentes à formação docente, desenvolvidas em parceria com professores da Educação Básica que participaram de um projeto Guarda-chuva, realizado no período de 2014 a 2019, pelo grupo de pesquisa que coordenamos, no âmbito de programas de pós-graduação *stricto sensu* de universidades do Brasil e da Colômbia. Fundamentado pela epistemologia da complexidade, tem por objetivo refletir sobre a formação de professores para atuarem no contexto da cibercultura, constituído de complexidades tecnológicas e linguísticas, e caracterizado pelos multiletramentos que tecem a vida cidadã de professores e alunos. A pesquisa colaborativa foi adotada, neste estudo, como metodologia e princípio educativo e científico, de qualidade político-educativa, e a Análise Textual Discursiva fundamentou a análise e interpretação de dados. Os resultados obtidos, a partir de entrevista semiestruturada, realizada entre fevereiro e maio de 2019, com seis professores formadores, atuantes no Ensino Superior e/ ou na Educação Básica, conduzem à conclusão de que a formação de professores precisa articular as dimensões pedagógica, política e cultural para um fazer docente em um cotidiano escolar marcado por incertezas e conflitos que se processam no campo social, da ciência e da tecnologia; pelas diversidades de cultura e de linguagens; pela polifonia dos conflitos que impele o professor a compreender o significado e o lugar social da escola. Essa realidade desafia o professor a formar-se para a problematização, o enfrentamento e a superação coletiva de situações desafiadoras, dentre elas, a de educar no contexto de complexidade que se manifesta cotidianamente na cibercultura.

Palavras-chave: cultura digital; formação de professor; epistemologia da complexidade. pesquisa colaborativa.

Investigación en educación cibercultural: formación docente para / en complejidad

RESUMEN. Este texto es el resultado de una de las investigaciones colaborativas relacionadas con la formación del profesorado, desarrollada en alianza con profesores de Educación Básica que participaron en un proyecto Paraguas, llevado a cabo de 2014 a 2019, por el grupo de investigación que coordinamos,

en el ámbito de los programas. cursos de posgrado stricto sensu de universidades de Brasil y Colombia. A partir de la epistemología de la complejidad, pretende reflexionar sobre la formación del profesorado para trabajar en el contexto de la cibercultura, consistente en complejidades tecnológicas y lingüísticas, y caracterizada por las multiherramientas que tejen la vida ciudadana de profesores y alumnos. La investigación colaborativa fue adoptada, en este estudio, como una metodología y principio educativo y científico, de calidad política y educativa, y el Análisis Textual Discursivo fue la base para el análisis e interpretación de los datos. Los resultados obtenidos, a partir de una entrevista semiestructurada, realizada entre febrero y mayo de 2019, con seis docentes docentes, que laboran en Educación Superior y / o en Educación Básica, llevan a concluir que la formación docente necesita articular las vertientes pedagógica, política y cultural para la enseñanza en una rutina escolar marcada por las incertidumbres y los conflictos que se dan en los campos social, científico y tecnológico; la diversidad de culturas e idiomas; por la polifonía de conflictos que impulsa al docente a comprender el significado y el lugar social de la escuela. Esta realidad reta al docente a formarse para la problematización, afrontamiento y superación colectiva de situaciones desafiantes, entre ellas, la de educar en el contexto de complejidad que se manifiesta a diario en la cibercultura.

Palabras-clave: cultura digital; formación docente; epistemología de la complejidad; investigación colaborativa.

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Introduction

The scenario of socio-cultural developments that presents us in the 21st century indicates a 'becoming' other in education, impelling us to move towards new methodologies of pedagogical work, multiple epistemic universes and ethical-aesthetic principles, which impel to think about teacher training and the exercise of the profession of educator in a context of techno-informational transformations that occur in the movement of creation, recreation, use and reinvention of information and communication technologies (ICT).

The reasons why this evolution appears need to be studied within what we call digital civilization. Vinck (2018) highlights, in his study of digital humanities, that the phenomena of communication and production of information and knowledge, highly mediated by technologies, today, are building a new paradigm to face the world. The fourth industrial revolution, for example, not only brings with it the incorporation of technologies based on automation processes, but also transformed interpersonal dynamics in all areas (Stringer, Lewin, & Coleman, 2019). In the educational field, humanity faces the need to break with the established paradigms, to effect changes in the teaching and learning processes. The new dynamics of relationships influenced by digital civilization transform all pedagogical processes into complex study scenarios that require constant attention and research.

The teacher is expected, for example, to be prepared to create, (re) build processes and proposals, re-build paths, when entering daily knowledge. In this sense, training will be necessary through which he appropriates the scientific and technological advances of human knowledge, so that, based on his practice, he can contribute to the social quality of the school and the students' critical citizenship.

It is in this perspective that we conduct the discussions in this text, which presents the result of one of the collaborative researches on teacher training, called 'Multi-course practices and teacher training: educational applications that enhance reading and textual production', developed by one of our teachers, in partnership with professors from other universities, as part of an Umbrella project entitled 'Multi-tools, technologies and teaching in cyberculture', carried out from 2014 to 2019, within the scope of stricto sensu of graduate programs in universities in Brazil in partnership with a graduate program at the School of Education at the Sergio Arboleda University of Colombia.

The emergence of reflecting on teacher education in contemporary times has led us to develop, in a relational and collaborative perspective, research that is driven by the following question: how to train teachers, whose teaching performance is involved with literacy policies that are developed in line with the technological and linguistic complexities of a world characterized by the multi-tools that weave the citizen life of teachers and students, in cyberculture? In order to answer this question, the researches of master's and doctoral students we guide have as objective: to reflect on the process of teacher training, in the context of cyberculture, focusing on social interactions and the pedagogical possibilities of a practice founded on the multiplicity of languages and cultures. This reflection involved six teacher educators participating in the

Umbrella Project mentioned above: three from Higher Education who guided research on teacher training and three from Basic Education who developed research on teacher training, between 2017 and 2019¹.

The analysis and interpretation presented in this text include part of the data generated in two semi-structured interview sessions with each of the six teachers, with a duration of approximately 2 hours for each session. The discursive excerpts used in this text resulted from the corpus built at the heart of that project, based on the dialogues we carried out on the concept of training, complexity, technologies and pedagogical practice; the reconfiguration of methodologies to meet the challenges of / in cyberculture; the knowledge of teachers and the demands of teacher training for complexity, which involve the transformation of pedagogical practice, based on the use of digital technologies.

In this process, we are guided by the cycle of critical reflection proposed by Ibiapina (2008): How has my teacher training process been to meet the complex demands of the current social context? Where did the ideas that underpin this formation historically come from? What is the meaning of the actions I take as a teacher in the classroom? What is the role of the choices made in building students' citizenship?

Thus, to meet this proposal, we will discuss, in the first part of the text, the conceptions of teacher training and complexity, as well as the development of a pedagogical praxis in this perspective; in the second part, we refer to the need for permanent teacher training that takes into account the importance of building the social role of the teacher to face the challenges of praxis to be developed in the context of cyberculture; then, we deal with the importance of teacher education, from the perspective of collaborative research, which we assume as a research methodology that is part of the Umbrella Project that we develop.

Teacher training: challenges posed by the complexity of the social context

The reflections we bring here weave what we understand by complexity and teacher training. The discussion of training, due to complexity, leads us to talk about changes and breaks in paradigms that persist in dominating the current social order, but do not meet the demands of production of knowledge in today's society, whose propositions take as a basis the uncertainty, the contradiction, as well as the tension "[...] between the aspiration to a non-fragmented, non-compartmentalized, non-reducing knowledge and the recognition of the unfinished and incompleteness of any knowledge" (Morin, 2011, p. 7).

Teacher education needs to emerge from clear and defined proposals for professional development that allows teachers to incorporate the complexity paradigm as we conceived it in this study, which is consistent with what one of the six teachers² who collaborated with us participating in this research enunciates:

Training teachers in complexity, in this contemporary society, I understand as super important, given that Morin's theory of complexity presupposes relativity, a relativization, right? It is ... considering this issue of the subjectivity of each being, considering the educational reality in which the teachers are inserted. So, it would not be a linear formation model; it would not be standardized. It would not even be a model. It would be something in which we were able to meet the subjectivities of each one. Moreover, this issue comes from the challenge imposed on people who understand training based on the needs of each person's peculiarities (Fênix).

What Fênix brings in his speech concerns a conception of teacher training that takes into account concepts of complexity, such as unpredictability (non-linear training), respect for diversity and difference (meeting the subjectivities of each one, starting from the peculiarities of each person), and the paradox that leads us to face the challenge of thinking about teacher training from the limits and obstacles that have historically constituted the educational context (considering the educational reality in which teachers are inserted).

Therefore, it is necessary to think of a formation that considers teachers as authors of their pedagogical practice, woven by their experiences, experiences, and knowledge. This means placing them at the centre of the debate and educational problems, considering them as collaborators who are not limited to complying with standards and implementing educational models to transmit content.

In the field of education, the complexity paradigm becomes the focus for facing the challenges of digital civilization. However, the promotion of this way of seeing the world, in the context of teacher education, is still laconic. In Colombia (and it has not been different in Brazil), the educational situation caused by the coronavirus showed the lack of preparation of teachers to face the challenges of digital education and the lack of the necessary skills to adapt to the changes generated by the global contingency (El Tiempo, 2020).

¹ All participants in this research signed the Consent Form, assigning copyright, as required by the Ethics Committee. Opinion Number: 3,471,095. CAAE: 00285018.7.0000.0057.

² In this text, the subjects' identities were preserved. Therefore, we refer to them by the following pseudonyms, which were chosen by the subjects themselves: Fênix, Cecília, Lícia, Reivax, Orquídea, Clarice.

Teachers, in this context of uncertainties, discuss the real conditions of their actions, the possibilities of transforming acting and thinking, as well as the importance of training for the realization of the re-elaboration of practice. Therefore, teachers understand that it is necessary to open up to the new:

The students that we find today, in the classroom, are no longer the ones who looked at books naturally, but technological students, who no longer care about what the teacher says in the classroom. Therefore, it is necessary to rethink teacher training for pedagogical praxis at all times (Raquel).

I believe that, at the present time, it is not even that we do not want to, that we tend to remain in a traditional practice, using the didactic book, to stick to maintaining the authority to use a blackboard; but the class doesn't accept; these students of ours no longer accept certain methodologies. I think that we will change over time, right? I think the big difference is not the technology; it is the methodology [...] Either you open it up to a collective construction, to an effective construction of knowledge, there, or not, people! (Lycia).

In these teachers' speech, we interpret the relevance of thinking about the urgency of professional training to exercise teaching in the current political and socio-historical context, marked by digital technologies. Teachers emphasize the construction of new methodological possibilities that aim to reconfiguration traditional pedagogical practices, intending to develop teaching actions that result in new learning in response to the challenges of this digital context.

The teacher has lived with complex situations in every day of his pedagogical work. Its challenge is to intensify the dialogue between school culture and multimodal and multi-hypermedia culture; its social responsibility is to think about students' training increasingly involved with digital technologies (TD), with social networks, with cell phones, with the information that changes every moment. The teacher's concern turns, especially, to the intellectual and personal formation of his students, in a way that helps them to demystify erroneous and mistaken concepts, disseminated in an agile and intelligent way by the media so that they produce a plurality of meanings from different places where they are located.

For this to be possible, it is necessary to think about the training of a professional who knows how to architect, together with other educators, projects and proposals that contribute to the problematization, coping, and collective overcoming of challenging situations, among them that of education in the context of cyberculture. Bates (2016, p. 520) understands that.

The use of technology needs to be combined with an understanding of how students learn, how skills are developed, how knowledge is represented through different media and then processed, and how learners use different senses for learning.

The development of pedagogical practice, in this perspective, implies a process of teacher education for/in complexity, which takes place via paths of training actions, which contemplate the intense social demands and require a political, critical, reflective, and purposeful; this means committing to work that takes into account the different histories, cultures, ethnicities and social reality.

Also, due to the exponential increase in digital technologies for teaching and learning, the teacher requires constant preparation and technological education. Within the complexity paradigm, multimodal thinking is necessary, but there must also be an awareness of the improvement in the management of technological resources by the teacher. Consequently, the importance of creating techno-pedagogical rationality based on paradigms of complexity arises. The rationality that is nurtured by the teacher's ability to understand social phenomena holistically and by his constant process of improving and managing ICT.

In this sense, teacher training, whether initial or continued, will need, in the context of cyberculture, to move towards other literacies that contain polysemic meanings, which may enable the teacher to think about a pedagogical practice that values the experiences, relationships, and processes of personal and professional life, which establishes a rhizomatic relationship between school and world, between subject and world, aiming at establishing critical and investigative dialogical actions in pedagogical practice, so that it is transformed, daily, into socially and culturally situated practices.

The changes promoted by TD call us to critically discuss their challenges and their potential for education, the re-signification, and expansion of reading and writing practices, based on the principles of multi-literacy pedagogy; therefore, they invite us to rethink teacher training and pedagogical actions, in a scenario that challenges us to build knowledge-based on projects that contemplate multimodal, multisemiotic languages and different ways of producing meanings, aiming at a policy of improving teacher training, from Basic Education to the University.

What moves us to follow these paths of study and research? Our commitment to teacher training leads us to the understanding that we need to think about pedagogical practices based on human actions, woven by a complexity that involves considering the transformations and implications of scientific and technological innovations with an education that goes through (re) elaborations constant in the teaching and learning process. Such changes lead us to recognize the need for teacher training to work with diverse practices that include multimedia, multimodality, Multiculturalism, and multi-tools.

The teaching function moves in a social context of forces in conflict, of transformations that arise from different fields of human knowledge, which are complex and require the teacher to carry out a constant reflection process that guides his pedagogical work. Forming a teacher in the networked knowledge society is a process whose complexity consists of affective and cognitive factors, experiences, and knowledge that begin with human training, continue with professional training and extend to teaching practice. In the opinion of some of the researching teachers and trainers interviewed, training teachers for complexity has several meanings:

Training teachers in the face of all this complexity is ... learning to deal with differences. Because we live this today; we live, with great strength and clarity, the presence of diversity in undergraduate courses, right? [...] (Cecília).

To train teachers in the complexity of the current context ... to train professionals who can meet this multiplicity of demands that the teacher has and that arises all the time within the context of Education, especially in school. The current scenario is one of many social and political transformations. We live a moment, in the country, to transform ... very intense; it has the technological transformations that interfere, the cultural ones. [...] face these challenges and do it based on some principles, those principles that will be fundamental to guarantee a formation that we defend, a formation that wants to be human, solidary, a human formation (Lícia). To the formation of teachers for complexity, in the context of cyberculture, I believe it is necessary ... it is ... we reflect on an epistemology of teaching practice, right?

Understand how teachers' knowledge ... they are constituted, mobilized, right? To develop the work in the classroom. [...] I believe that the teacher training process itself for complexity, it starts from the moment the teacher ... he ... he ... embarks on the path of authorship, the creation of arts curriculum that is related to the context of cyberculture, in the daily life of the classroom (Reivax).

The subjects' speeches lead us to interpret that teacher training needs to contemplate human interaction's complex processes. Teachers and students, being dialogical beings, are immersed in the paradigmatic games of language. Therefore, it needs to prevail in the formation of the complexity paradigm teacher, which unites complex and straightforward, which stresses multidimensionality, from which the subject articulates otherness, multiple languages, and shared physical realities. The dialectic resulting from this articulation constitutes a system dynamic that can be revealed by the teacher's reflexive exercise. The reflection of the process allows him to reframe these elements to guarantee that the teacher is not merely part of a paradigmatic reality; he also takes responsibility for the positive transformation of the phenomena he participates in. In other words, he becomes an active and emancipatory subject (Rodríguez Jerez, 2019).

In this study, we rely on the ideas of Morin (2011) to explain the term complexity, in which the known dialogues with new knowledge, based on the impossibility of the conclusion and the final point and the multidimensional and transversal approach to knowledge. Morin (2011) explains that complexity does not mean complication; originates from the Latin *complexusque* means to weave together; therefore, it is "[...] the fabric of events, actions, interactions, retroactions, determinations, and chance, that constitute our phenomenal world. [...] it presents itself with the disturbing features of confusion, of the inextricable, of disorder in chaos, of ambiguity, of uncertainty" (Morin, 2011, p. 17-19).

This constitutes a challenge to the teacher, whose training process, which took place amid modern science, in a social, political, ethical, and affective context, has not allowed him to assess the fragmentation and the lightening of his practice and his training, but the simplify, hierarchize order. Training (becoming) a teacher involves including the study and criticism of theories; the teacher training process needs to allow the teacher to critically deepen their practice and the school's practice; it needs to generate doubts and questions about its certainties, generate ruptures in thought and action. Gatti (2003, p. 196) reminds us that

[...] it is necessary to see teachers not as abstract beings, or essentially intellectual beings, but as essentially social beings, with their personal and professional identities, immersed in a group life in which they share a culture, deriving their knowledge, values and attitudes of these relationships, based on the representations constituted in this process that is, at the same time, social and intersubjective.

In a society in constant movement and in growing social and educational complexity, the teacher will need to be trained in the scientific, cultural, contextual, psycho-pedagogical and personal spheres; training that gives him "[...] a solid background that should enable the future teacher to assume the educational task in all its complexity" (Imbernón, 2011, p. 68).

In this sense, the concept of training that we embrace here recognizes the importance of the teacher becoming a reflective professional to build knowledge through a reflection in action, an investigator of his practice, which would train an investigative process character (Schön, 2000). However, we cannot summarize training to the limits of practical rationality; to a "[...] technical, applied, 'practical' view of teaching work, emptying its social, cultural and political dimensions" (Nóvoa, 2017, 1110, emphasis added). Teacher training needs to focus on the critical and political exercise of/in the teaching profession, given the need for the teacher to become an agent that promotes social transformation (Giroux, 1997), who can build pedagogical actions, which lead students to question and question knowledge, guided by a critical and purposeful dialogue.

Training (becoming) a teacher implies the constitution of a professional identity that can face and assume the complex functions attributed to the school, in the current world. Therefore, as Rodríguez Jerez points out (2019, p. 15, our translation), "It is not only important to know how to teach in context or to make students more competent, but above that is the social responsibility that education implies"³.

The training projects, which aim to build a teaching professionalism, are based on the technical, scientific, and pedagogical aspects of personal, professional, and labor dimensions. At this moment in human history, when digitality is a marker of culture, differentiating our way of life today from other times, teacher education needs to be managed and constituted in order to consider the set of complex phenomena that involve: virtual devices for instant communication, global connectivity, transience, instability, new forms of relationship with people and the world, the redefinition of time and space; in short, everything that constitutes man himself, since each age, each way of life configures new movements in society and human subjectivity.

Therefore, we are referring to the need for teacher training, in the context of digital culture⁴, to have ethics and responsibility, collaborative work and flexibility, critical and creative thinking, problem-solving, digital skills, knowledge management, and authorship. "In this sense, training author teachers is a sociocultural demand where the creation and customization of educational materials contribute to the expansion of authorship, innovation, and creativity in the teaching and learning processes" (Santos & Rossini, 2017, p. 37). The teacher will need to be creative, to authorize himself, to think about his pedagogical actions, to create his learning objects; because the teaching and learning process, which involves highly connected subjects, will need to consider the needs of students, the mastery of content and the demands of the external world.

It is also necessary to analyse the complexity and the distinction - as observed in the introduction to this text - between the teaching and learning processes that, currently, do not seem so clear. However, an in-depth perspective of analysis may lead us to infer that the teaching processes are concentrated in the teachers' immediate actions, while the learning processes depend on the means of apprehension that the students create. This obvious distinction opens up a world of vast opportunities to analyse subjects' interaction dynamics in the pedagogical field.

The subject that teaches has its characteristics that need to be understood, and that differs, in many aspects, from the subject that learns. However, the dialogical process between those who learn and those who teach is mediated by a shared physical reality, which is the language and the immediate context: digital civilization. As a mediator and digital civilization, language, as a field of articulation, allows pluralities to converge in interpersonal actions.

Education, now, cannot only aim to train teachers and students. It is also necessary to carry out a training process based on competencies that combine theoretical and practical knowledge, aiming at the development and social transformation. Rodríguez Jerez (2020, p. 24-25, our translation)⁵, in light of the above, highlights that

³ "No solamente es importante saber enseñar en contexto o hacer estudiantes más competentes, sino que por encima de esto está la responsabilidad social que conlleva la educación".

⁴ In this text, the term digital culture and the term cyberculture are used with the same meaning to address contemporary culture, media culture, and its interface with digital technologies.

⁵ Si se asume el conocimiento y manejo tecnológico como una habilidad de los docentes del siglo XXI es pertinente tener un marco referente tanto teórico como operativo de las competencias digitales del siglo XXI para profesores. Las competencias, como se establecen en los diversos marcos de formación, deben integrar el componente actitudinal, epistemológico, praxeológico y ético del quehacer docente ante las transformaciones de la civilización digital... Tal vez este sea el derrotero por seguir para mejorar los espacios de formación en el mundo".

If technological knowledge is supposed to be a skill for 21st-century teachers, it is pertinent to have a theoretical and operational framework for teachers' 21st-century digital skills. The competences, established in the different training structures, must integrate the attitudinal, epistemological, praxeological, and ethical component of the teaching task in the face of digital civilization [...]. Perhaps this is the course to be followed to improve training spaces in the world.

The transformations of digital civilization have led to a necessary rethinking of the teacher's role, way of being, living, and acting in the 21st-century classroom. Understanding the complexity that constitutes the education scenario, in the context of cyberculture, would help understand the dynamics, ethical and social responsibility of those who teach and learn, and the diversity of languages in digital civilization.

From training to practical: the social construction of the teacher's role

In order to deal with new concepts, models, and functions that cause changes in educational processes, and to appropriate the growing social demands represented by digital technologies, which trigger new organizational-cultural procedures in the school routine, the teacher needs to update his practices so that they are resignified, seeking to overcome linear logic, the fragmented process of knowledge, which means fleeing the limits of the disciplines that fragment knowledge, in the search for the reintegration of the whole. Gatti (2017, p. 722-723) explains that

We live in a changing social scenario, where competitiveness and individualism are characteristic traits in which feelings of accomplishment or injustice are built, in conditions of multiculturalism, new languages, and the emergence of demands for social justice and educational equity. In this environment, the work of teachers and educational managers becomes effective; student learning is built.

This changing social context, marked by digital culture, or cyberculture, poses to the teacher the challenge of constituting his practice from a multidimensional and transversal approach and building network knowledge, based on the transdisciplinary, multisemiotic, hypermedia, and multimodal perspective. The teacher of the current context must reconnect knowledge and face uncertainties, aiming to solve problems, based on the possibilities of interaction that TD provide; he will no longer be able to assume the lecturer's position but of an organizer of knowledge and learning.

TDs have given everyday life a dynamic character, making it, contrary to what many still insist on affirming, a place of creative production and permanent novelties. The teacher who acts in this context requires planning classes and executing them, but the daily reinvention of the classroom, the school, the community in which this school is inserted, the world, in short. The pedagogical practices that weave the current classroom's daily life cannot be disconnected from the multiplicity of transgressive practices in contemporary society, which must have an emancipatory function (Santos, 2011). Regarding this multiplicity of practices, Galeano (1999, p. 328) well represents them, in saying:

In the warp of reality, however bad it is, new fabrics are being born and these fabrics are made of a mixture of many different colours. Alternative social movements are expressed not only through parties and unions: but also, but not only. The process [...] occurs, above all, at the local level, but everywhere, all over the world, a thousand and one new forces are emerging. They sprout from the bottom up and from the inside out.

In this perspective, we could talk about the subversion of practice, of the instituted, to make room for becoming, for the unexpected: praxis. Imbert (2003, p. 15) leads us to a reflection on what to do in the educational field:

Distinguishing praxis and practice allow for a demarcation of the characteristics of the pedagogical enterprise. Is there a place in the school for a practice? Or is it that, most of the time, they are, above all, simple practices that develop in it, that is, a doing that occupies time and space, aims at an effect, produces an object (learning, knowledge) and a subject-object (a student who receives this knowledge and suffers these learnings), but who at no time has a perspective of autonomy.

In this perspective, one would deal with the finished object, with a labelled teaching project, with a closed knowledge, which would reduce complexity and social facts to irrelevance, disregarding human action (Santos, 2011).

On the contrary, in a context of multiple literacies, of cultural and linguistic diversity, praxis permanently puts us in front of the field of invention, of conflicts and contradictions, of receptivity to new ideas, of questions, of creation. Praxis presents us with the world of confrontation and not that of omission,

of escape. Praxis is an emancipation project (Imbert, 2003). In this way, the teacher will be able to generate paths and point out directions that support his / her actions, based on an ethical commitment to his students, to the whole school, to the local and global communities, since the pedagogical work takes place in a context of powers, which intermingle dynamically, amid conflicts and dissonances.

The practice provides interaction between the subjects to achieve an objective; it's instant. Praxis is configured as "[...] a creation that creates new realities and meanings" (Imbert, 2003, p. 18), which aims at the subject's autonomy. However, it implies a collective project, in which the teacher does not intervene from the outside, because "The teacher-student relationship knows here a dialectical transformation understood in the most rigorous sense of the term: in the new relationship that unites each other, each element sees itself changing" (Imbert, 2003, p. 38).

However, understanding the other is only possible when rationality is built that houses the complexity of the subjects' phenomena. More specifically, educational actions need to develop a dialectical state of consciousness with a series of cognitive skills, developed by the learning process that assumes the different realities in their multidimensions.

It is necessary to define the basic principles of teacher and student training so that collective thinking that responds to others and others and improving the different realities is developed. Consequently, it is necessary to assume rationality that allows an intersubjective construction, in which the communicative conditions are necessary for the creation of discursive ethics. Therefore, the rationale mentioned here is the overcoming of conflicts presented in the dynamic use of language, enabling social constructions based on the discursive responsibility of each of the subjects involved in a given interaction process.

Information saturation imposes the challenge of moving from the knowledge society to the intelligence society, that is, a society that makes fair use of information and responds to the need for constant human training. After all, rationality, as a possibility for action, creation, and recreation of the world, is humanity's very element.

The field of teacher education: collaborative research and knowledge production

If reality presents itself to us in a complicated way, it requires us to think and act in complexity beyond simplified and isolated knowledge. We perceive and feel a world whose notion is always provisional, given TD's constant and rapid transformations. Freire (1996, p. 76) states that "The world is not; the world is being." In order to develop research, we need to start from the principle that reality cannot be analysed and interpreted by a single look, as an irrefutable and immutable truth; nor can the researcher be placed on one side and the researched subject on the other, creating a separation between subject and object because this is contrary to the interactive and dynamic movement of life.

So, we cannot take frozen conceptions of training, pedagogical practice, teaching, and learning, of technologies as real, as they will be distorted if their movement is neglected, especially by education, more specifically, by the teacher, by the school. The complex fabric of life itself, together with the complex nature of education, reveals no way to achieve predictable results. In this context, collaborative research can contribute to understanding the researched phenomenon because the interaction needs to be at the heart of the research process.

Considering, therefore, this dynamism of life that cannot be explained by a single look and the technological and digital changes that pose challenges of all kinds to teachers, demanding the growing need for training, we developed, from 2014 to the present moment, in group research, which operates under two strict sense postgraduate programs in a Brazilian public university, research at the masters and doctoral levels which reflect and problematize issues involving topics such as: initial and continuing education of Basic Education teachers, cultural diversity, multimodality and multisemiosis, multi-tools, digital convergence, the articulation between teaching, learning and research in teacher education, authorship, among others. At a private university in Colombia, a year and a half ago, we undertook a digital transformation process, which assesses how to transform pedagogical and didactic models through the correct incorporation of digital technologies. This digital transformation arises from a research process in teaching practices, learning styles, implementation of international milestones for technological mediation, and appropriation of the ethical component required by the contemporary world.

The pillars that support the research carried out in the scope of the *stricto sensu* postgraduate program combine adventure and methodological rigor - the craftsman's research skills - and demand a discussion on

the concrete movements that the researcher needs to carry out to sustain and dynamize the construction of his research. , of research understood as creative work, as a doing that occurs in the back-and-forth between the theoretical construct and the experiences. In this space-time, of tension between the theoretical and the empirical, as a constitutive dimension of doing research, that research on teacher education, in the context of digital culture, is outlined. There, there is adventuring of the researcher subject in the production of knowledge, in the desire to develop a reflective and problematic look at his research object, to fertilize the scientific object's construction.

In this structuring movement, which generates the necessary weaving of threads, in which the discourse is constituted, from an infinity of other discourses (Bakhtin, 2004), the researcher will then be the one who will choose the colours of the lines with which will weave, generating the theory-praxis nexus in the construction of his research. This weaving implies the presence of the other, the interlocutors of the empirical field. In this sense, Bakhtin (2003, p. 394) explains:

Here the cognisant does not ask the question of himself or a third party in the presence of the dead thing, but of the cognoscible himself. [...]. There the criterion is the accuracy of knowledge but the depth of penetration. [...] the complex dialectic of the interior and exterior. The individual does not only have an environment and environment, he also has his own horizon. The interaction of the horizon of the knowing as the horizon of the knowing. [...] in them two consciences intersect and combine (the self and the other); here I exist for the other with the help of the other.

Research becomes a procedure that induces critical thinking, which always includes the researcher's self-criticism and the knowledge built in the interactive relationships between the 'me' and the 'other'. In this process, the chosen procedure is relevant; the researcher subject's involvement and implication with the researched object, research as a social commitment, of political-educational quality. Also, the researcher must guarantee a space in which the object can speak to him, taking into account the relevance of the dialectical space between researcher and research subjects; that is, to consider that there is a movement of the object that invades the subject and vice versa; therefore, "How, then, would qualitative research be possible outside the dynamics of the interaction between the researcher and the researched?" (Macedo, 2000, p. 19).

We are part of a networked knowledge society that requires us (ourselves) always to reinvent ourselves, as indicated by the hermeneutic⁶ and biological fabric of cyberculture. Therefore, the researcher will not be able to place himself [...] outside the reality he studies, outside of it, of the phenomena to which he seeks to capture their meanings and understand [...] he acts in a medium where the very existence unfolds [...]" (Triviños, 1987, p. 121). Especially in a society in which eternal and perennial truths crumble, knowledge and ways of knowing are historical, continually changing, because we live in a time that does not match the idea of rest because every reason will need to be confronted, adjusted, and controlled by an ethical imperative. In the society of virtuality, the real is understood; therefore, with a margin of unexpected, unforeseen.

Ibiapina (2008, p. 23) understands that collaborative research is configured as a process that contributes to the "[...] realization of the ideals of training and professional development and the production of theories closer to the social aspirations of changing the room classroom, school and society". In this sense, we take collaborative research as an educational and scientific principle, of political and educational quality, which becomes a necessary procedure and social commitment; what requires the researcher to venture into the search for the contradictory and the unknown that weaves the subjects' life and social relations, since reality is not given; it is built collaboratively.

Regarding the construction of a collaborative research project, Desgagné (2007, p. 15) clarifies:

Certainly, starting from the central pivot that constitutes the joint reflection démarche, or co-construction, carried out by the interaction between researcher and teachers, the project will be articulated in two ways: a) as an improvement project for teachers who want to question or explore an aspect of your professional practice; b) as a research project, the object of which is a concern for the researcher.

Therefore, for the understanding of reality and the collective construction of new interventional actions, collaborative research, as one of the aspects of qualitative research, has been configured as a viable proposal for co-participation between researcher and teachers, since we start from the principle that teachers are made reflection and questioning of their practice are necessary; to the researcher, the opportunity to

⁶ The term here is being used to say about the interpretive and comprehensive effort that subjects need to make in situations of everyday life (Macedo, 2000).

produce new knowledge. Two of the training subjects with whom we dialogue and who develop collaborative research, for teacher training, within the scope of the Licentiate and Basic Education courses, have built, from their experiences, as researchers and as teacher trainers, a concept of collaborative research that relates to the discussion that we bring here.

One of the most important aspects of collaborative research is, precisely, its emancipatory nature [...] when we give the opportunity for them, our peers, you know, to theorize about their own practices, other reflections arise that go beyond, which go beyond everyday life of the classroom. And these reflections, they open, in my opinion, spaces to transform the subjects' social and cultural contexts, right? Because, as collaborative research is also a social practice, it can transform, improve and modify both a pedagogical reality and a reality beyond the walls of the school (Reivax).

When we think of non-fragmentation, of the process of interaction in the formation of the emancipated subject, in cyberculture, we are positioning ourselves in favor of a collaborative action, ranging from pedagogical actions through research. The subject is constructed, in all its complexity, by interactive and discursive movements; what is sought is the collaboration and also the cooperation of the agents. So, in collaborative research, there is a network construction, with no hierarchy of knowledge and subjects in the research (Orchid).

The teachers' testimonies lead us to understand the importance of dialogical exercise to construct discursive rationality and collaborative actions. In cyberculture, emancipation is strengthened through the mediation of collaboration networks. Therefore, it is essential that, in the teacher training processes, dialogic practices are developed, which establish spaces for interaction for network collaboration; and a construction of new possibilities so that we can understand the complex fields of education. The experience of otherness becomes a necessary action, in teacher training, to consolidate an educational community responsible for social transformation.

Desgagné (2007, p. 8) explains that "The idea of collaboration between researchers and practicing teachers, for the construction of knowledge related to teaching, comes from the observation of the existing gap between the world of professional practice and that of research that aims to clarify it. It". Collaborative research has contributed to compensate for a way to bridge the gap between the world and school, theory and practice, university, and school. The collaborative training proposal, considering the nature of interpersonal interactions, conceives the school and the teacher training movement itself as instances that can provide teachers, through reflection, to seek solutions to social problems that emerge from/in the school context, to face the complexity of educational situations, to negotiate senses and meanings.

Collaborative research as a formative process, as research-training is part of a critical reflection that takes as a starting point, as questioning, the path of confrontation:

[...] in collaborative research, we diagnose socio-historical, philosophical, psychological needs, among others, and create the conditions for manifestations of conflicts, contradictions and, through collaboration and critical reflection, privileging the confrontation zone, in which beliefs and conceptions are destabilized. As a result, possibilities are generated in the re-elaboration of thought-action (Bandeira, 2016, p. 65).

The multiple voices and the different points of view, as well as the diversity of contexts that establish the confrontation of conceptions and practices, reveal the complexity inherent to the nature of the teaching action that contributes to the reconstitution of the pedagogical praxis, based on the negotiation of meanings and sharing meaning. This construction of meanings requires a great understanding of the various phenomena that occur in reality. This understanding is made possible through the communicative dimension of language. The dialogical exercise in teacher education can collaborate in the construction of knowledge arising from mutual understanding and social consensus, conditions for society's transformation.

Conclusion

We hope that the reflections and discussions generated here can contribute to rethinking the processes of teacher training and pedagogical actions in the areas of Basic Education and Higher Education, expanding this debate to the formation of discursive subjects, considering that the training process teachers cannot be disconnected from human development and from the learning possibilities that present themselves in the networked knowledge society in which we live.

We believe that this discursive fabric is relevant, in the sense that it can contribute to a reflection on teacher education and its relationship with the movements of subjects and senses that are updated in the classroom, in the teacher-teacher, teacher-student relationship, teacher-student-school-society.

Finally, we consider it necessary to continue articulating academic cooperation projects in various world contexts. In dialogue and constant reflection, they allow the construction of an epistemic apparatus that can improve the various teaching and learning processes. The digital civilization offers excellent opportunities to build an intelligent and emancipatory society through communication and discursive ethics. To continue rethinking the complexities of the act of teaching, the act of learning, the mediation of language, and the immediate contexts are the challenges proposed to consolidate a joint effort in favor of education and social transformation.

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