

A teachers' formative process in soil education takes place while integrated to their life stories

Selma Barbosa Bastos^{(1)*} , Fabiane Machado Vezzani⁽¹⁾ , Valentim da Silva⁽²⁾ 
and Marcelo Ricardo de Lima⁽¹⁾ 

⁽¹⁾ Universidade Federal do Paraná, Departamento de Solos e Engenharia Agrícola, Programa de Pós-Graduação em Ciência do Solo, Curitiba, Paraná, Brasil.

⁽²⁾ Universidade Federal do Paraná, Setor Litoral, Matinhos, Paraná, Brasil.

ABSTRACT: The teacher's formative process is developed by a critical reflective response to the paths of life, the profession, and its practices. The teacher's formative process analysis should consider the process's objectives (theoretical, practical, and emancipatory), and the dimensions that make up the teacher (person, practices, and profession). As a result, this study aims to introduce the elements that outline the categories stemming from the relationship matrix between the objectives and the dimensions, and use them to analyze a formative process in Soil Education assessed using Formative (Auto)biographical Narratives. The research subjects were 61 teachers active in the Public Education System in the cities of Campo Largo and Curitiba, state of Paraná, Brazil, who took part in the formative process known as Soil Program for Teachers within the Soil at School Project from the Federal University of Paraná, held in 2018. Data collection was performed through written narratives given in response to three groups of open-ended questions, which aimed to encourage teachers to think deep. We performed the Content Analysis in the narratives while differentiating expressions associated with the elements in each category, and, consequently, the frequency of the expressions was recorded. As for the Theoretical Objectives within the analysis of the Program, in which the teacher is the study object, we found that the teachers built and rebuilt knowledge and expertise about the soil while drawing on the relationship between the formative conceptual approaches and the recollection of their professional and personal experiences through the Narratives. Within the Practical Objectives, in which self-formation is analyzed, the Narrative influenced a critical and reflective perspective about the person, the practice, and the profession, while driving teachers to their self-formation and creating their professional identity. As for the analysis of the Emancipatory Objectives, which demonstrate the change of reality, the teacher's transformation was seen in their change of attitude and practices, as well as in their intent to get involved with the school. We concluded that the elements proposed to outline the nine categories were effective to analyze the formative process in Soil Education, by taking into account, in an integral way, the Objectives of the analysis and the Dimensions that make up the teacher while in his/her formative process. We would also like to point out that the Narratives were an important instrument for continuous education in Soil Education.

Keywords: continuing education, (auto)biographical approaches, (auto)biographical narratives, self-formation, professional identity.

* **Corresponding author:**
e-mail: selmabbastos@gmail.com

Received: August 03, 2020

Approved: December 14, 2020

How to cite: Bastos SB, Vezzani FM, Silva V, Lima MR. A teachers' formative process in soil education takes place while integrated to their life stories. Rev Bras Cienc Solo. 2021;45:e0200122. <https://doi.org/10.36783/18069657rbc20200122>

Editors: José Miguel Reichert , and Ricardo Simão Diniz Dalmolin .

Copyright: This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided that the original author and source are credited.



INTRODUCTION

Professional education and its practice are complex processes. Complexity is addressed by Morin (2007) as that which: presents itself with the disturbing traits of a mess, of the inextricable, of disorder, of ambiguity, and of uncertainty¹. To consider complexity, the observer-conceptor must integrate themselves in the observation and conception (Morin, 2007). Therefore, the same author states: the paradigm of complexity will result from the set of new conceptions, new views, discoveries of new reflections that will agree among themselves, get together. The principles of complex thinking will necessarily be the principles of disjunction, conjunction, and implication².

As a result, the teacher's formative process is carved out through the critical reflective response to the paths of life, the profession, and its practices (Nóvoa, 1992a). The teaching profession's necessary expertise is defined by the reflection *in* and *about* the practice (Nunes, 2001) and not just through accumulating courses, content, or skills (Nóvoa, 1992a). That shows how relevant it is for formative processes to be centered in the teacher as a person while taking into account their life story as a facilitator to understand the subjectivities (Souza, 2007), the perspective of those involved, and the individual and collective forms (Monteiro and Fontoura, 2016), which create a complex context in the permanent reconstruction of the teacher's identity.

The professional identity involves the conception that each teacher has its own art of being a teacher. The way each teacher teaches directly depends on what they are as a person when teaching. That is why it is impossible to break up the "professional self" from the "personal self" (Nóvoa, 1992b). While reviewing (auto)biographical studies — and the author uses the parentheses to convey the double meaning of the expression: formative and research movement — Nóvoa (1992b) identified three dimensions of approaches: the *Person (the teacher)*, the *Practices (of the teachers)*, and the *Profession (of teaching)*. A teacher is a *Person* who abides by principles and values. The expertise used in the teachers' *Practices* is learned in the exercise of the *Teaching Profession* and not at University, where content and theory are introduced. Therefore, the *Person's* teaching *Profession* is performed within an institution, while learned and developed before, during, and after the specific academic education.

When analyzing the teachers' formative process, Nóvoa (1992b) points out that it is possible to study teachers through (auto)biographical approaches explored in a way to understand aspects where the teacher is taken into account: researcher's object of study (essentially Theoretical Objectives of the analysis), subjects of their own formative process (essentially Practical Objectives of the analysis), and agents in the process within their own formative process and the transformation of reality (essentially Emancipatory Objectives of the analysis).

We understand that beyond the study of a formative process, the process itself shall take those Objectives into account, in other words, the teachers are at the same time objects of study, subjects of the formative process, and agents in the processes; while also being analyzed in their three Dimensions, the teacher as a Person, the teacher's Practices, and the teaching Profession, by transcending the categorization of Nóvoa (1992b) about the study approaches for analysis criteria, given the complexity involved in the professional formative process. Consequently, while taking into account the integrated Objectives and Dimensions for the analysis of a formative process, we arrive at the nine categories Nóvoa (1992b) used to systematize studies with (auto)biographical approaches: (Theoretical-Person; Theoretical-Practices; Theoretical-Profession; Practical-Person; Practical-Practices; Practical-Profession; Emancipatory-Person; Emancipatory-Practices; Emancipatory-Profession). Therefore, this research aims to introduce the elements that outline each one of the categories and use them in the analysis of a formative process in Soil Education assessed by means of Formative (Auto)biographical Narratives, while

¹ Free translation.

² Free translation.

taking into account the complexity of the integrated research of the Objectives of the analysis and the Dimensions that make up the teacher while in his/her formative process.

MATERIALS AND METHODS

Formative process: Soil Program for Teachers at School Project/UFPR

The formative process we analyzed was the Soil Program for Teachers developed by the University Extension Program Soil at School (SSP) from the Federal University of Paraná (UFPR), in four different classes: two classes of teachers active in the Public Education System in the city of Campo Largo and two classes of teachers active in the Public Education System in the city of Curitiba, both in the state of Paraná, Brazil. The Program was organized in monthly and/or biweekly meetings with a total program load of 16 to 24 hours given by the professors in the Agriculture Engineering and Soil Department from UFPR.

The meetings brought up contents from several areas within Soil Science (Table 1), as well as support materials (books, primers, booklets, scripts for the development of experiments, videos, models, experiments about soil properties and characteristics, soil samples, maps, and images) developed by the SSP/UFPR. The field activities were intended to explore and visit the main soils in both cities and in the region where the teachers develop their practices while correlating them with other components in the landscape, use, and occupation, as well as the role of the soil and its importance in the environment. Workshops were held during the project when teachers set up educational experiments based on scripts developed by the SSP/UFPR and shared them with the class about how the experiments could be used in their pedagogical practices. Also, the teachers actively employed in the Public Education System within the city of Curitiba went on a guided tour of the Soil Education Exhibition held by the SSP/UFPR to present the ways to use educational resources when working with contents related to soil in Basic Education.

Research subjects

The research subjects were 61 teachers with a teaching degree in Pedagogy, Biology, Geography, and Science. They were active in Elementary Schools within the Public Education System in Campo Largo and Curitiba, Paraná, Brazil. The teachers were subdivided into four different classes of the Soil Program for teachers held during the year 2018.

Table 1. Program content and approach used in the Soil Program for Teachers from the Soil at School Program/UFPR offered in 2018 by the Public Education System (in the cities of Campo Largo and Curitiba) in the four classes in which research subjects were studied

Contents	Approach	Public Education System			
		Campo Largo		Curitiba	
		Class 1	Class 2	Class 1	Class 2
Soil ecosystem services	Lecture	x	x	x	x
Soil composition, horizons, and morphology	Lecture with use of educational resources	x	x	x	x
Main soils in the region	Field class	x	x	x	
Soil and water conservation	Lecture	x	x	x	x
Workshop on experiments in Soil Education	Experiment setup by attendees	x	x	x	x
Soil fertility and nutrient cycling	Lecture	x	x	x	x
Soil biology	Lecture	x	x	x	
Urban soils	Lecture with use of educational resources			x	
Composting	Experiment setup by attendees				x
Vermicomposting	Experiment setup by attendees				x

This study was approved by the UFPR's Research Ethics Committee, according to Process CAAE: 90397118.4.0000.0102. The teachers were invited to participate in the study at the beginning of the Program, and they consented to it and signed the Free and Informed Consent, which enabled the use of the data for research purposes.

Data collection

At the end of the Program, the teachers who were subjects of the study received a script comprised of three groups of questions (Table 2) intended to guide them to the Formative (Auto)biographical Narrative about their experiences in the formative process, in the form of a written record. In this study, the double meaning of the expression (auto)biographical, as introduced by Nóvoa (1992b), is considered: formative and research movement, hence the use of the parentheses.

Systematization and data analysis

The Formative (Auto)biographical Narratives were analyzed through the Content Analysis Method (Bardin, 2011). In the teacher's reports, we were able to identify expressions associated with the *elements* that make up the categories established between the Objectives of the analysis of the formative process and the Dimensions that make up the teacher.

The *elements* were drawn from the Systematization of (Auto)biographical Approaches about the study of the teachers' formative process introduced by Nóvoa (1992b), in which the author considered the relationship matrix between the implicit Objectives of the study intended by the researcher and the Dimensions that the intended study offers

Table 2. Intentionalities and set of questions from the Roadmap for the Written Record of Formative (Auto)biographical Narratives

Intentionality	Set of questions from the script for the written record
Relationship between the knowledge already constituted before the Program, contents presented during the Program, and knowledge reworked after the Program.	About your conceptions in Soil Education — from self-knowledge, self-reflection, your personal, life stories, your subjectivities. Which of the activities proposed encouraged dialogues and relations between the personal experiences, events, and understandings already constituted and Soil Education? Establish a reflexive relationship with what allowed for sense-making, openness, imagination, connection, recognition, attitude, confidence, decision-making, and flexibility with Soil Education from the Program onwards. How do you position yourself before possibilities and challenges related to Soil Education? Describe those relationships briefly and reflexively.
Contributions from the Program's educational resources and the methodology to pedagogical practice.	Did the Program's educational and pedagogical procedures make it possible problematizing knowledge about Soil Education? Establish a reflexive relationship with what allowed for sense-making, openness, imagination, connection, recognition, attitude, confidence, decision-making, and flexibility, and that can be used in your teaching activities in Soil Education, from the Program onwards. What activities and/or proceedings do you believe enable the construction of a sensitive look and deed for changes in attitudes, practices that transform realities? What approaches (disciplinary, curricular knowledge, or experiences) do you consider that cover the personal, professional, and organizational aspects of Soil Education? Describe those relationships briefly and reflexively.
Reflection as a professional who works in Soil Education; how Program activities have the potential to generate changes in professional action (inside the school) and in personal reality (outside the school) in relation to soils.	How do you see yourself as a professional and person who works in Soil Education? If we consider teacher education as a set of wisdom that unifies knowledge by valuing personal development, professional development, and institutional development, can we build up the constitution of the teacher's identity? Can one say that professional identity develops itself under the social, political, and historical context in which the teacher is placed? Do the guidelines presented in this Program indicate the possibility of exercising dialogue, of listening that could contribute to the best quality in the formative processes? Could the activities that were proposed in the Program be welcomed in the context of school processes in which you work, integrated into life stories and memories of those who attend it? With the Program's activities, would it be possible to contribute to/contemplate dreams of and wishes for transforming the school and reality? Describe those relationships briefly and reflexively.

to address. The Objectives are: Theoretical, when the teacher is considered the research object; Practical, when the teacher is considered the subject of their formative process; and Emancipatory, when the teacher is considered the agent of the processes within his/her own formative process, as well as the transformation agent of their own reality. The three Objectives embody the three Dimensions of the teacher while in his/her formative process: Person (the teacher), Practices (of the teachers), and Profession (of teacher). From the relationship between Objectives and Dimensions, Nóvoa (1992b) pointed out nine non-exclusionary categories that complement one another. Therefore, we posited the *elements* that make up those integrative categories to analyze the formative processes. The *elements* are introduced in table 3.

As classification criteria of the *expressions*, we considered the content of the reports that most contemplated one or more than one *element*, given that some *elements* were repeated among the categories, as they are non-exclusionary. Consequently, the use of the word “essentially” intended to highlight the category where the teachers’ reports showed a greater number of *elements*. By performing the systematization of the data this way, the subjectivity was assumed in this process, which is an aspect that varies from one researcher to another. Similar reports were grouped together and transformed in *expressions* that would incorporate the general context of the same. Reports that did not show any similar contents were grouped together and represented by the *expression* “Others”. With the categorization of the *expressions*, it was possible to see the subjective relationships established by the teachers with the contents addressed during the formative process, as well as to identify the category in which this formative process influenced teachers the most when it comes to Emancipatory, Practical, and Theoretical Objectives of the analysis of the continuous learning in Soil

Table 3. Characteristic elements of each of the nine categories resulting from the relationship matrix between the Objectives of the analysis of the formative process and the Dimensions that constitute the teacher proposed by Nóvoa (1992b)

Dimensions that constitute the Teacher	Objectives of the analysis of the formative process		
	Theoretical (the teacher is the researcher's subject of research)	Practical (the teacher is the subject of their own formation)	Emancipatory (the teacher is an agent in their own formation and the transformation of reality)
Person (of the Teacher)	Theoretical-Person: <i>(the teacher's life)</i> Life story (phases and narrated memories); Relations with health (mental, stress); Way of thinking; Personal development; Sociological perspectives.	Practical-Person: <i>(formative activities performed by the teacher)</i> Teacher's formative practices focused on personal development; Self-formation dynamics; Analysis of materials; “Innovative” educational trends focused on the person of the teacher.	Emancipatory-Person: <i>(teacher's attitudes)</i> Teacher as an “object” and “subject” of formative processes; Contexts and routines; Relevance of the formative process; Meaning of life and professional meaning.
Practices (of Teachers)	Theoretical-Practices: <i>(the teacher in practice)</i> Pedagogical practices; Description of activities performed; Fulfillment of curriculum development; Pedagogical knowledge; Contents received.	Practical-Practices: <i>(the teacher-attendee of a formative process at work)</i> Recall the practices (narratives and accounts); Self-formative reflection; Proposition of interventions via discourses and practices; Relevance of the practice.	Emancipatory-Practices: <i>(the transformation of the teacher)</i> (Auto)biographical experiences; Changes in pedagogical practices; Educational innovation; Collaborative formation; Study groups; Relevance of the formative process.
Profession (of Teaching)	Theoretical-Profession: <i>(the teacher's life in their profession)</i> Professional life cycles; Autobiographies; Reframing of knowledge; Conditions for the exercise of the profession, based on curriculum proposals and institutional plans.	Practical-Profession: <i>(self-formative actions)</i> Of an institutional character; Teacher education programs (initial and continuing); Alternative/innovative practices with a self-formative bias; Professional career path.	Emancipatory-Profession: <i>(attitudes for a professional change)</i> Transformation of the profession; Professional autonomy; Professional identity; Narratives of the profession; Professional conditions; Teacher formation; Transformation of reality.

Education. The frequency of the *expressions* was recorded from a total of 61 Formative (Auto)biographical Narratives and graphically represented.

RESULTS

While drawing on the identification of the expressions and their respective correspondence with the elements (Table 3), the results will be shown in line with the Objectives of the intended study, according to Nóvoa (1992b); in other words, Theoretical, Practical, and Emancipatory Objectives of the analysis of the formative process studied.

The teacher as an object of study - essentially Theoretical Objectives of the analysis of the formative process in Soil Education

Figure 1 shows the expressions identified from the Formative (Auto)biographical Narratives that were associated with the elements referring to the categories of essentially Theoretical Objectives and in the Three Dimensions: Theoretical-Person, Theoretical-Practices, and Theoretical-Profession (Table 3).

In the Theoretical-Person category, in which the expressions related to the teacher as a Person, teachers in continuing education in soils expressed themselves in a sociological, historical, and personal perspective (Figure 1). From the elements related to this category, presented in table 3, we must highlight *life story (narrated phases and memories); the way of thinking, personal development, and sociological perspectives*. It can be seen that the expressions “*New vision on the importance of the soil,*” 18 %; “*Reflection and problematization of expertise,*” 8 %; “*Importance of the Program for personal and professional development,*” 7 %; and “*Reflection of personal actions concerning the soil,*” 5 % (Figure 1) displaced the central content of the Program to the life stories of the teacher as a Person.

The Theoretical-Practices category was the most contemplated in the narratives. The expression “*Acquisition of information about the soil*” had the highest frequency, 33 %, and was classified in this category due to its intrinsic relationship with the *received content* element (Figure 1 and Table 3). This expression indicates a connotation of “more informed” subjects and announces that the teachers, at the end of the Program, understood that they have other understandings about soils.

The expressions “*Acquisition of information about the soil*” at 33 %, and “*Reframing of knowledge and expertise,*” at 23 % (Figure 1), were mainly associated with the element *pedagogical expertise and received content* that comprises the Practices Dimension (Table 3). These two expressions indicate the construction/reframing of concepts attributed to the person’s experience and life story in the educational context.

The Theoretical-Profession category, in which the teacher’s profession is investigated, was scarcely considered in the narratives, possibly indicating a weakness in the design and/or execution of the formative process. The expressions “*The structure of the school and the materials on the theme are challenges,*” 8 %; and “*Intentions to bring the Program’s activity to the school environment,*” 8 % (Figure 1), were associated with the elements professional life cycles; autobiographies; knowledge reframing; conditions for the professional practice, based on curricular proposals and institutional plans (Table 3).

The teacher as the subject of his/her formative process - essentially Practical Objectives of the formative process analysis

Figure 2 shows the expressions identified from the Formative (Auto)biographical Narratives that were associated with the elements referring to the categories of essentially Theoretical Objectives and in the three Dimensions: Practical-Person, Practical-Practices, Practical-Profession.

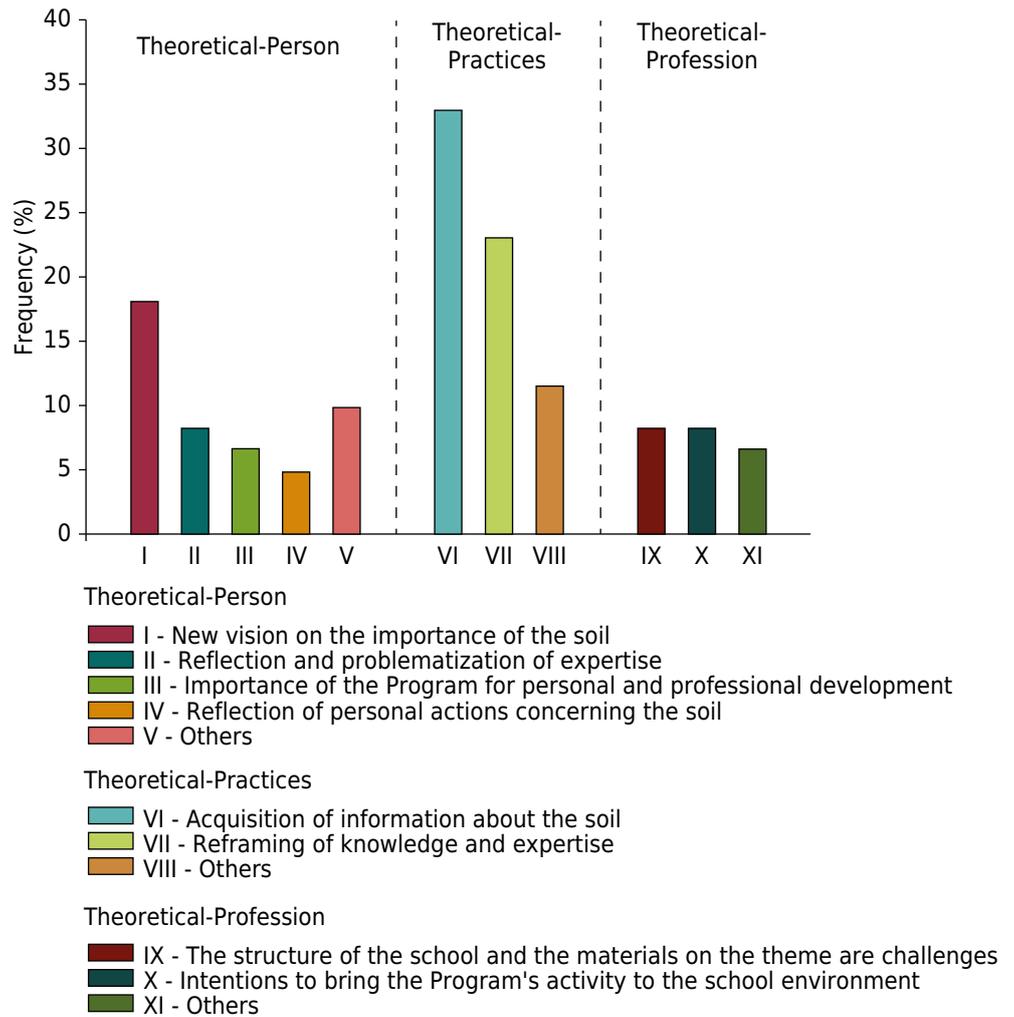


Figure 1. Frequency of Expressions identified in the Formative (Auto)biographical Narratives of 61 teachers attending the Soil Program for Teachers from the Soil at School Program/UFPR, that were associated with the elements from the categories of essentially Theoretical Objectives (the teacher as the subject of study of the formative process in Soil Education): Theoretical x Person; Theoretical x Practices; Theoretical x Profession.

The Practical-Profession category, related to self-formative actions, was the one with the highest frequency of expressions (54 %). The most common ones were “Intentions to use the Program’s educational resources in class,” 15 % of the teachers, and 11 % announced that “They will use the Program’s educational resources in class” (Figure 2).

The expressions linked to the reflection of the pedagogical practice itself and categorized as Practical-Practices stood out in “Importance of practice and the use of educational resources” in Soil Education for 13 %, and “Reflections of pedagogical practice” for 8 % (Figure 2), which are associated with the elements of Self-formation reflection and Relevance of practice (Table 3).

The methodology of the Program emphasized strategies so that the teachers could use educational resources in their classes. Thus, expressions of greater frequency in the Practical-Profession categories: “Intentions to use the Program’s educational resources in class” (15 %), “They will use the Program’s educational resources in class” (11 %), “The practical activities led to the reflection of the pedagogical practice” (7 %); and Practical-Practices: “Importance of practice and the use of educational resources” (13 %), and “Reflections on pedagogical practice” (8 %) (Figure 2), indicated that this purpose of the Program was achieved. Although these percentages are low separately, we emphasize that teachers who understood the importance of the Program methodology are significant, as 54 % of teachers showed their expressions on this aspect.

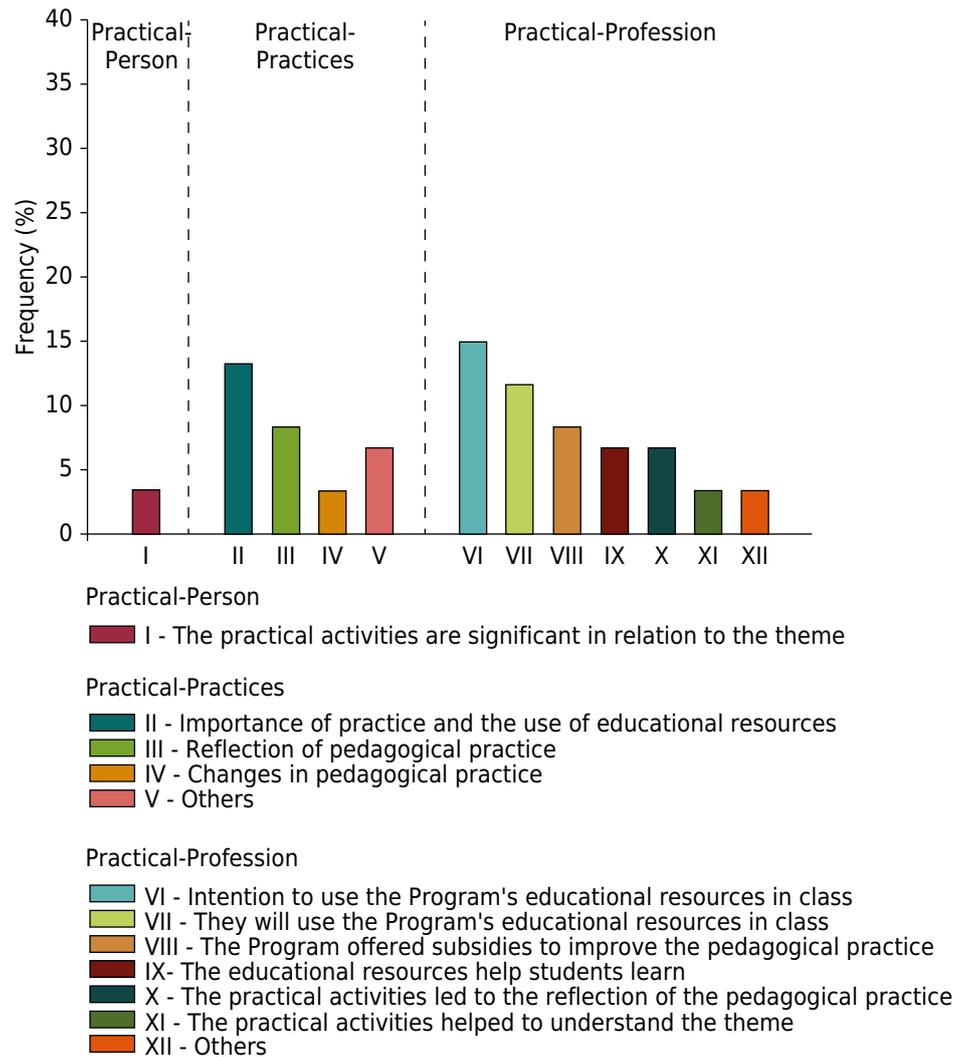


Figure 2. Frequency of Expressions identified in the Formative (Auto)biographical Narratives of 61 teachers attending the Soil Program for Teachers from the Soil at School Program/UFPR that were associated with the elements from the categories of essentially Practical Objectives (the teacher as the subject of their education in the formative process in Soil Education): Practical x Person; Practical x Practices; Practical x Profession.

The teacher as an agent in the formative and transformative processes of reality - essentially Emancipatory Objectives of the formative process analysis

The most contemplated category in the teachers' narratives in the Emancipatory Objectives was the Emancipatory-Person, showing that the emancipation process is more linked to the teacher as a Person, to their attitudes (Figure 3). In this context, 25 % of the teachers showed intentions of "Raising students' awareness of soil conservation" the most frequent expression in the category.

The expressions that stood out in the Emancipatory-Practices category indicate a desire to transform pedagogical practices in Soil Education by 38 % of teachers, since 23 % of teachers narrated that the Program prompted "Reflections and changes in the pedagogical practice" and 15 % showed intentions to "Apply what was learned in the Program at school," expressions associated with the elements of changes in pedagogical practices, educational innovation and the relevance of the formative process (Figure 3 and Table 3).

Still, 13 % of the teachers expressed the "Need for formative process on the topic" for the transformation processes to occur in the teaching profession, an expression linked to the elements of the transformation of the profession; professional autonomy; professional

identity; narratives of the profession; professional conditions; teachers' research-formative process in the Emancipatory-Profession category (Figure 3 and Table 3).

DISCUSSION

The teacher as an object of study - essentially Theoretical Objectives of the analysis of the formative process in Soil Education

When reflecting on the concepts about soils presented during the formative process, evidenced from the expressions of the Theoretical-Person "New vision on the importance of the soil" ; "Reflection and problematization of expertise"; "Importance of the Program for personal and professional development," 7 %; and "Reflection of personal actions concerning the soil" (Figure 1), the teacher started to establish a relationship with what they experienced during the Program, which is characteristic to the person in the educational process. Besides, this relationship is more important than the knowledge presented itself, as defended by Chiené (2010), the expertise can be enriched by the understanding in itself.

In the active dialogical relationships, as was the methodology used in the Program, the subjects involved in the process create new concepts and their own content (Bakhtin,

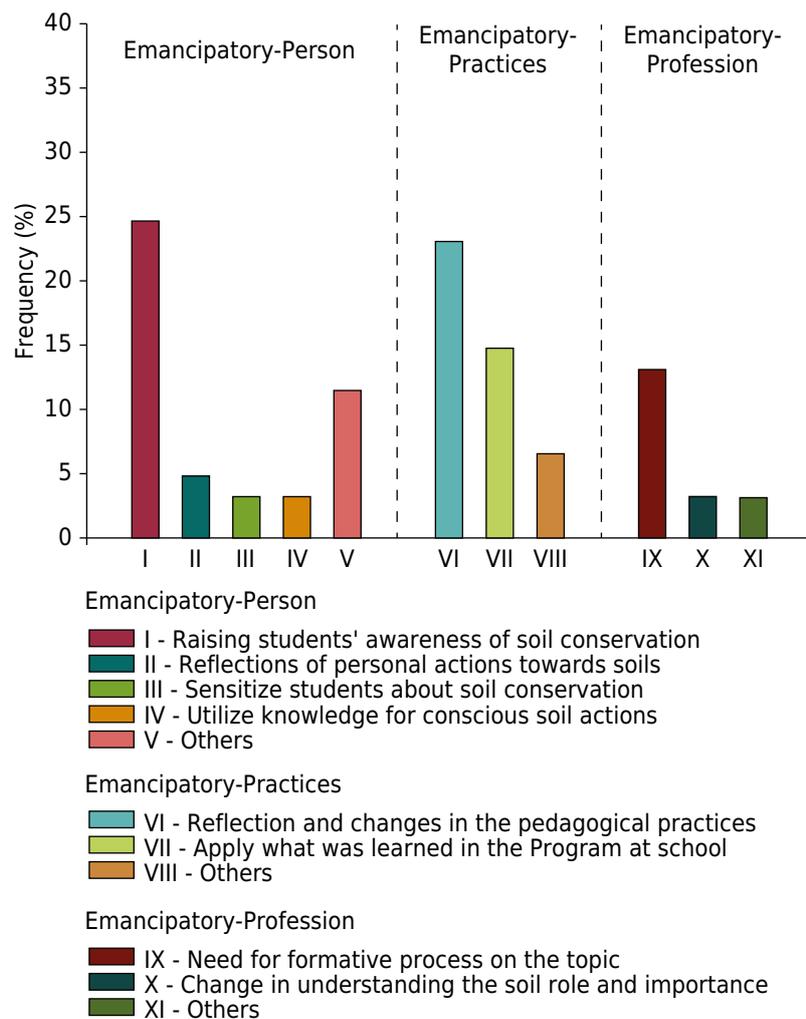


Figure 3. Frequency of Expressions identified in the Formative (Auto)biographical Narratives of 61 teachers attending the Soil Program for Teachers from the Soil at School Program/UFPR that were associated with the elements from the categories of essentially Emancipatory Objectives (the teacher as an actor in the processes of education and transformation of reality in the formative process in Soil Education): Emancipatory × Person; Emancipatory × Practices; Emancipatory × Profession.

2016). Aspect identified through the expression "Acquisition of information about the soil", related to the received content element of the Theoretical-Practices category (Figure 1 and Table 3). More than the dialogue classes, the teachers, when prompted for elaborating the narratives, demonstrated to rethink the change of their pedagogical practices beyond the proposals during the Program. In this sense, it is observed that the teachers, in their formative process, completed the Program knowing something about soils that they did not know before, which, according to Larrosa (2017), characterizes a formative process.

Besides the conceptual reframing, the expressions "Acquisition of information about the soil," and "Reframing of knowledge and expertise," (Figure 1), associated with the element pedagogical expertise and received content in the Theoretical-Practices category (Table 3) prompted other meanings to the knowledge already constituted in the teachers and, consequently, other epistemological conceptions that have the potential to promote other pedagogical practices in Soil Education. That is because in the recollection of memory to elaborate the narrative, the teacher needs to retrace the lived path, and when choosing the words, they need to build the meaning of the narrative, which will be the construction of the meaning of the formative experience. Moreover, this movement is the reframing of practice (Cunha, 1997; Monteiro and Fontoura, 2016). The construction/reframing established between the teachers' prior knowledge and expertise caused by the contents used during the Program is the relationship between what prompts meaning and what gives meaning to these educators. According to Monteiro and Fontoura (2016), reframing is a creative process in which new meanings are attributed based on what is already known, which results in another knowledge, different from what existed and from the transmitted content. In continuing education, the teacher can build and reframe knowledge, beliefs, values, and attitudes (Ferreira and Santos, 2016).

In the Theoretical-Profession category (Figure 1), one of the situations that the teacher is forced to face in the professional practice stands out: the material conditions of the school ("The structure of the school and the materials on the theme are challenges," 8 %). However, there is also an articulation between the professional development acquired during the Program and the school ("Intentions to bring the Program's activity to the school environment"). An aspect that corroborates with Nóvoa (1992a) that the formative process cannot be ignored by an intervention in the school space.

From the three categories analyzed, it is emphasized that the teacher constructed and reconstructed knowledge and expertise about the soil related to his/her life experience and professional identity. The relational and dialogical analyses on understanding and reframing concepts regarding soils have enabled teachers to recreate their expertise. The attention given to the teachers' life stories through narration enabled them to mobilize the experience. Therefore, the Formative (Auto)biographical Narrative, reflective and integrated with the contexts, expands the teacher's senses as a person, relating to their learning experiences in continuous dialogue with the formative peer/formative agent in an intricate totality of the personal and professional dimensions. Thus, in formative programs on soil, the teachers' experiential expertise should be valued.

The teacher as the subject of his/her formative process - essentially Practical Objectives of the formative process analysis

The intentionality put in the narratives and represented by the expressions "Intentions to use the Program's educational resources in class," and "They will use the Program's educational resources in class" (Figure 2) indicates the teachers' desire to incorporate the experiences lived in Soil Education in their profession. Cunha (1997) defends the idea that narratives cause changes in the way people understand themselves and others and, for this reason, are an alternative to the formative process, "in which the subject learns how to produce their own formative process, self-determining its trajectory".

When a person reports intentionality and desires, this indicates the need for changes and, this announcement gives away the movement of reframing the formative process (Cunha, 1997) (expressions “Importance of practice and the use of educational resources” and “Reflections of pedagogical practice”, associated with the elements of Self-formation reflection and Relevance of practice, Practical-Practices category, Figure 2 and Table 3). Thus, the narrative is not a description of what the person has lived, but how they give meaning to what they have experienced and, in this way, legitimizes their self-formative process, characteristic of the analysis of this essentially Practical Objective of the formative process, in which the teacher is the subject of his/her formative process (Nóvoa, 1992b).

Adding the most frequent expressions in the Practical-Profession (“Intentions to use the Program’s educational resources in class”, “They will use the Program’s educational resources in class”, “The practical activities led to the reflection of the pedagogical practice”), and Practical-Practices (“Importance of practice and the use of educational resources”), and “Reflections on pedagogical practice”) (Figure 2) with the most frequent expression in the Theoretical-Practices category (“Acquisition of information on the soil”, Figure 1), we understood that the use of educational resources (models, experiments on soil properties and characteristics, soil samples, maps, and images) to support the pedagogical practice by the lecturers who taught the Program made it possible for teachers to understand the content, enabling learning and knowledge construction, and even encouraging the teachers to use the expertise on their pedagogical practice at school.

The reflection of the practice, evidenced in the categories and respective expressions: Practical-Practices: “Reflections on pedagogical practice”; “Changes in pedagogical practice”; and Practical-Profession: “The Program offered subsidies to improve the pedagogical practice”; and “The practical activities led to the reflection of the pedagogical practice” (Figure 2) contributed to the constitution of the professional identity, given that when mobilizing the expertise from experience, the teachers made a critical reading of the profession, looking for references to modify it. When studying a continuing education program in Soil Education for teachers, Cirino et al. (2015) also observed that the formative process provided changes in the teachers’ practices. These professionals started to use pedagogical practices adapted from the program. The strategy used during the Soil Program from the Program Soil at School/UFPB and the one described by Cirino et al. (2015) has a relational, reflective character of knowledge reconstruction and practical application of the formative process.

The profession is constructed throughout the person’s life by social relations with others and perceived internal and external influences (Cardoso et al., 2016). Therefore, the construction of the Profession of the teacher is not dissociated from the teacher as a Person, as also stated by Nóvoa (1992b). In this way, the central process of the teacher’s formative process contemplates the person’s identity while recognizing it throughout his/her life story. Along this path, the person produces an intimate complexity of cognitive relationships that develop in practices, in which each person has their own way of being in the teaching profession. The teaching profession is a system of multiple identities, and each of them brings the experiences lived, the decisions made, the practice developed, the constructions and deconstructions while mobilizing their values and principles with their knowledge (Moita, 1992). Thus, regardless of the paradigm, the entire learning construction process is a possibility for theoretical research improvement and to expand formative practices by exploring concepts that constitute the Person-Practices-Profession Dimensions. Based on the expressions of the three categories (Figure 2) and the respective relationships with the elements in table 3, we concluded that the Soil Program was integrated into the teacher’s life path and the methodological guidance of the Formative (Auto)biographical Narratives helped in the construction of the meaning that the person gives to his/her practices and profession while making up a component of continuing education, as it highlights the reflective processes of theorizing the experience and constituting the professional identity.

The teachers' self-formation took place by reconstructing the experiences they lived during the Program in a reflexive way, inherent in the act of narrating. In this case, the Narrative stimulated a critical and reflective perspective on the person, the practice, and the profession, leading teachers to self-formation. Moreover, this process occurred when the teachers recollected and wrote on their practices when trying to reflect, understand, and relate aspects of lived formative processes, as well as of their professional performance. Therefore, the Formative (Auto)biographical Narrative is beyond what is read and written; it is taking the formative student (teacher) to his/her formative process.

The teacher as an agent in the formative and transformative processes of reality - essentially Emancipatory Objectives of the formative process analysis

It is noteworthy that the teachers understand the awareness expressed in the narratives, represented by the expression of the Emancipatory-Person category "Raising students' awareness of soil conservation" (Figure 3), as a movement from the outside in as if the teacher was able to raise the awareness of the student mechanically through the pedagogical practice. However, awareness is not something imposed, nor it is the appropriation of the other's discourse, but rather an attitude, as proposed by Freire (1979). So, the awareness process does not happen, since "consciousness emerges from the lived world, aims at it, problematizes it, and understands it as a human project"³ (Freire, 2002) and not as a transfer of something to someone. In any case, the teachers' intentionality to "raise awareness" is valid, as it is the critical conscience that inserts the subject into the world, as transformer of this world. However, "the construction of emancipation is something from the inside out, whose pace cannot be predetermined or imposed"⁴ (Demo, 2011).

The expressions "Reflections and changes in the pedagogical practice" and "Apply what was learned in the Program at school", associated with the elements of changes in pedagogical practices, educational innovation, and the relevance of the formative process (Figure 3 and Table 3), in addition to the transformation of practice, point to a desire to change reality.

The expression "Need for formative process on the topic" linked to the elements of the transformation of the profession; professional autonomy; professional identity; narratives of the profession; professional conditions; teachers' research-formative process in the Emancipatory-Profession category (Figure 3 and Table 3), puts in evidence the emancipatory effect because at the same time that the subject announces in the narrative the need for a formative process, he/she also cognitively reconstructs his/her experience reflexively and, therefore, creates new demands for his own formative process.

From the perspective of the emancipatory actions, the expressions in figure 3 indicated the relation of meaning that the subject in the formative process gives to his/her learning, not only in legitimizing the concepts but also in reframing the previous expertise in other areas. The exercise of narrating experiences drives the subject to elaborate on these meanings (Novais and Côco, 2018). Thus, the narrative is not only the product of an act of narrating, but it also has the power of effect on what the subject wants to narrate (Delory-Momberger, 2016). In this sense, the use of Formative (Auto)biographical Narratives was also an element of the formative process in the Program, aiming to integrate the learning promoted in the Program to the one teachers already had, because the emancipatory practice of the narrative shapes in the time and space of writing its relationship with formative experiences. What Novais and Côco (2018) propose is that when narrating the experiences lived some time ago, the subject manages to establish a displacement relationship to perceive another self, highlighting the personal and professional change in a timeless analysis. The investigative reflection on the formative process, from narrating, leads teachers to transform practical action in an emancipatory perspective.

The teachers' emancipatory perspective agrees with Nóvoa (1992a) that the whole formative process involves a project of action and transformation. It was observed that

³ Free translation.

⁴ Free translation.

the aspects related to the change of the teacher for the transformation of reality are not limited only to the personal and the professional realms, but also in the contexts that these teachers intervene, that is, in the school environment. Furthermore, Nóvoa (1992a) also points out that the formative process is not done before the change; it is done while at it. Thus, teachers' transformation of reality occurs in this effort of innovation and the search for the best paths for the transformation of the pedagogical practices in Soil Education, of the profession, of the school.

The three dimensions of the teacher in a formative process in Soil Education - Person, Practices, Profession

The formative process under analysis — Soil Program — instigated teachers about the three dimensions. However, it was not possible to state in which Dimension (Person, Practices, and Profession) there was the greatest change for the transformation of reality. The Theoretical-Practices; Practical-Profession, and Emancipatory-Person categories were the most evident in the formative process (Figures 1, 2, and 3). Specifically, the essentially Theoretical Objectives of the research were more closely linked to the teachers' Practices Dimension, mainly due to the importance attributed to the contents acquired during the Program for the reframing of the expertise. Regarding the essentially Practical Objectives of the teacher's Formative Process, the greatest relation found was with the teacher Profession's Dimension. It corresponds with the process of reflection on and changes in pedagogical practices to ensure more effective learning processes about soils, which is a self-formative process. Furthermore, in the context of the essentially Emancipatory Objectives, the teacher's Person Dimension became more evident, in the sense of the transformation of reality, since the process of emancipation of the subjects is related to values, principles, and beliefs, which are aspects that concern the teacher as a Person.

In that context, the formative process is constituted by complex processes that occur in the experiences lived throughout life, in the articulation between the personal and professional, inseparably. Moreover, it is worth noting that knowledge can be expanded by reflection-action-reflection itself, which is also made possible by the Formative (Auto)biographical Narratives. Chiené (2010), corroborating that perception, states that the formation process in the Person Dimension articulated at spaces of socialization (narratives, in this case) calls for another understanding, with the meaning that the person gives it, both in the field of his/her learning experience in the Professional Dimension and in their experience as a whole.

Also, the experience that promotes self-formation guarantees for teachers processes that cover the formative aspects in dialogue with family life, human coexistence, work, teaching and research institutions, cultural manifestations, and their multiple relations, integrated to their places and territories, which make up the Emancipatory Objectives of education. This understanding reinforces the will to manage their own formative process increasingly, the self-formation. Self-formation is a formative, emancipatory, evolutionary process; an activity that is always accomplished in practice, reframing knowledge, in the power of one having their own subject of education, theme under their control. The teacher is their own subject of research and their own subject of formation, the author (agent) to transform reality. This process can encourage overcoming challenges that demand another being-and-working in the profession. The results indicate that it is necessary to invest in other models of the continuing education process in Soil Education that would break through the traditional paradigm. Models that value the subjects' experiential knowledge and privilege the construction of knowledge by them, from the reflection on their professional practice, transform reality into practice.

Therefore, the continuing education of teachers in Soil Education must consider that the teacher is the actor throughout their formative process' main phases; the Dimensions in which he/she is constituted (Person, Practices, and Profession) and his/her interactions and complexity; besides their life stories. Therefore, as Nóvoa (1992a) suggests, it is

necessary to think about educational practices that enable the teachers' personal and professional emancipation, as well as contribute to consolidating a professional who has autonomy in the production of their knowledge and values. It should be noted that those propositions are targeted at not only the Soil Program for Teachers of the UFPR's Soil at the School Program but also at other similar formative processes, considering their contexts and realities.

CONCLUSION

The elements proposed to characterize the nine categories presented by Nóvoa (1992b) were efficient to classify the Formative (Auto)biographical Narratives and analyze the formative process in Soil Education considering, in an integrated way, the Objectives of the analysis and the Dimensions that constitute the teacher in his/her formative process.

The Formative (Auto)biographical Narratives, from the written record, allowed for rescuing teachers' experiences when they established subjective relations to the contents addressed during the formative process — the Soil Program —, putting the complexity of the professional education into evidence.

The expressions teachers used pointed out processes of reflection on the pedagogical practice in soils incorporated into their life stories and the (auto)biographical formative processes, which had contributed to the consolidation of professional identity. That is because it was evidenced that teachers gave new meanings to their learning and pointed out proposals for change in their pedagogical practices in Soil Education.

AUTHOR CONTRIBUTIONS

Conceptualization:  Selma Barbosa Bastos (equal),  Fabiane Machado Vezzani (equal),  Valentim da Silva (equal), and  Marcelo Ricardo de Lima (equal).

Methodology:  Selma Barbosa Bastos (lead),  Fabiane Machado Vezzani (supporting),  Valentim da Silva (lead), and  Marcelo Ricardo de Lima (supporting).

Software:  Selma Barbosa Bastos (equal),  Fabiane Machado Vezzani (equal),  Valentim da Silva (equal), and  Marcelo Ricardo de Lima (equal).

Validation:  Selma Barbosa Bastos (equal),  Fabiane Machado Vezzani (equal),  Valentim da Silva (equal), and  Marcelo Ricardo de Lima.

Formal analysis:  Selma Barbosa Bastos (lead),  Fabiane Machado Vezzani (supporting),  Valentim da Silva (supporting), and  Marcelo Ricardo de Lima (supporting).

Investigation:  Selma Barbosa Bastos (lead),  Fabiane Machado Vezzani (supporting),  Valentim da Silva (supporting), and  Marcelo Ricardo de Lima.

Resources:  Selma Barbosa Bastos (lead),  Fabiane Machado Vezzani (lead), Valentim da Silva (supporting), and  Marcelo Ricardo de Lima (lead).

Data curation:  Selma Barbosa Bastos (lead),  Fabiane Machado Vezzani (supporting),  Valentim da Silva (supporting), and  Marcelo Ricardo de Lima (supporting).

Writing - original draft:  Selma Barbosa Bastos (lead),  Fabiane Machado Vezzani (lead),  Valentim da Silva (lead), and  Marcelo Ricardo de Lima (supporting).

Writing - review and editing:  Selma Barbosa Bastos (equal),  Fabiane Machado Vezzani (equal),  Valentim da Silva (equal), and  Marcelo Ricardo de Lima (equal).

Visualization:  Selma Barbosa Bastos (lead),  Fabiane Machado Vezzani (supporting),  Valentim da Silva (supporting), and  Marcelo Ricardo de Lima (supporting).

Supervision:  Selma Barbosa Bastos (supporting),  Fabiane Machado Vezzani (lead),  Valentim da Silva (supporting), and  Marcelo Ricardo de Lima (supporting).

Project administration:  Selma Barbosa Bastos (lead),  Fabiane Machado Vezzani (lead),  Valentim da Silva (supporting), and  Marcelo Ricardo de Lima (supporting).

Funding acquisition:  Selma Barbosa Bastos (equal),  Fabiane Machado Vezzani (equal),  Valentim da Silva (equal), and  Marcelo Ricardo de Lima (equal).

REFERENCES

- Bakhtin M. Os gêneros do discurso. Tradução de Paulo Bezerra. São Paulo: Editora 34; 2016.
- Bardin L. Análise de conteúdo. São Paulo: Edição 70; 2011.
- Cardoso MIST, Batista PMF, Graça ABS. A identidade do professor: desafios colocados pela globalização. *Rev Bras Educ.* 2016;21:371-90. <https://doi.org/10.1590/S1413-24782016216520>
- Chiené A. A narrativa de formação e a formação de formadores. In: Nóvoa A, Finger M, organizadores. O método (auto)biográfico e a formação. São Paulo: Paulus; 2010. p. 129-42.
- Cirino FO, Muggler CC, Cardoso IM. Sistematização participativa de cursos de capacitação em solos para professores da educação básica. *Terrae Didat.* 2015;11:21-32. <https://doi.org/10.20396/td.v11i1.8637307>
- Cunha MI. Conta-me agora! As narrativas como alternativas pedagógicas na pesquisa e no ensino. *Rev Fac Educ.* 1997;23:185-95. <https://doi.org/10.1590/S0102-25551997000100010>
- Delory-Momberger C. A pesquisa biográfica ou a construção compartilhada de um saber do singular. *RBPAB.* 2016;1:133-47. <https://doi.org/10.31892/rbpab2525-426X.2016.v1.n1.p133-147>
- Demo P. Pesquisa: princípios científicos e educativos. 4. ed. São Paulo: Cortez; 2011.
- Ferreira JS, Santos JH. Modelos de formação continuada de professores: transitando entre o tradicional e o inovador nos macrocampos das práticas formativas. *Cad Pes.* 2016;23:1-15. <https://doi.org/10.18764/2178-2229.v23n3p1-15>
- Freire P. Pedagogia do oprimido. 34. ed. São Paulo: Paz e Terra; 2002.
- Freire P. Conscientização: teoria e prática da libertação: uma introdução ao pensamento de Paulo Freire. São Paulo: Cortez & Moraes; 1979.
- Larrosa J. Pedagogia profana: danças, piruetas e mascaradas. 6. ed. Belo Horizonte: Autêntica Editora; 2017.
- Moita MC. Percurso de formação e de trans-formação. In: Nóvoa A, organizador. Vidas de professores. Porto: Porto Editora; 1992. p. 111-40.
- Monteiro FMA, Fontoura HA. Narrativas de professores e processos de formação: Cuiabá (MT) e São Gonçalo (RJ) em diálogo. *RBPAB.* 2016;1:534-50. <https://doi.org/10.31892/rbpab2525-426X.2016.v1.n3.p534-550>
- Morin E. Introdução ao pensamento complexo. 3. ed. Porto Alegre: Sulina; 2007.
- Novais RMMC, Côco V. Abordagem biográfica: a dimensão da vida presente nos enunciados de pesquisa em educação. *RBPAB.* 2018;3:517-31. <https://doi.org/10.31892/rbpab2525-426X.2018.v3.n8.p517-531>
- Nóvoa A. Formação de professores e profissão docente. In: Nóvoa A, coordenador. Os professores e a sua formação. Lisboa: Dom Quixote; 1992a. p. 13-33.
- Nóvoa A. Os professores e as histórias da sua vida. In: Nóvoa A, organizador. Vidas de professores. Porto: Porto Editora; 1992b. p. 11-30.
- Nunes CMF. Saberes docentes e formação de professores: um breve panorama da pesquisa brasileira. *Educ Soc.* 2001;22:27-42. <https://doi.org/10.1590/S0101-73302001000100003>
- Souza EC. (Auto)biografia, histórias de vida e práticas de formação. In: Nascimento AD, Hetkowski TM, organizadores. Memórias e formação de professores. Salvador: EDUFBA; 2007. p. 59-74.