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ARTICLE

THE NEEDS ON THE TRAINING OF SCIENCE TEACHERS IN COUNTRYSIDE SCHOOLS: AN INVESTIGATION IN THE SEMI-ARID OF PIAUÍ, BRAZIL

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ABSTRACT: The study of needs on the training of science teachers is essential for diagnosis, planning and decision-making in the field of education. These needs can be defined as concerns, desires, necessities and problems sensed and detected in the teaching process, typical of values emerged in a given context. The purpose of this article is to examine the results of a research that intended to identify the training needs of science teachers in countryside schools of a township located in the semi-arid region of Piauí, Brazil, between 2017 and 2018. For this, data were collected through the use of forms, questionnaires, interviews and documents. The subjects who collaborated on the research were Science teachers and principals of rural schools, teachers and students from a Rural Education Program with a focus on Natural Sciences. The analysis revealed that science teachers in countryside schools were in need of better working conditions, implementation of unconventional teaching methodologies and specific knowledge in the field of natural sciences. The results also remark the unaware need of developing a contextual teaching and knowledge about rural education.

Keywords: Rural Education, Science Teaching, Teacher Education.

NECESSIDADES FORMATIVAS DE PROFESSORES DE CIÊNCIAS DE ESCOLAS DO CAMPO: UMA INVESTIGAÇÃO NO SEMIÁRIDO PIAUIENSE

RESUMO: A análise das necessidades formativas docentes é fundamental para o diagnóstico, a planificação e a tomada de decisões na área da Educação. Essas necessidades podem ser definidas como preocupações, desejos, carências e problemas sentidos e percebidos no processo de ensino, representativos de valores surgidos em determinado contexto. O objetivo deste trabalho é discutir os resultados de uma pesquisa que procurou identificar as necessidades formativas de professores de Ciências de escolas do campo de um município do semiárido piauiense entre os anos de 2017 e 2018. Para isso, os dados foram coletados por meio de formulários, questionários, entrevistas e documentos. Os sujeitos que colaboraram para a pesquisa foram professores de Ciências e diretores de escolas do campo, professores e estudantes de um curso de Licenciatura em Educação do Campo com enfoque em

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Ciências da Natureza. A análise mostrou que os professores de Ciências das escolas do campo do estudo possuíam as necessidades de melhores condições de trabalho, de adotarem metodologias de ensino não convencionais e de saberes específicos da área de Ciências da Natureza. É ressaltado nos resultados que eles também possuíam as necessidades, embora não conscientes delas, de desenvolverem um ensino contextualizado e de saberes sobre a Educação do Campo.

Palavras-chave: Educação do Campo, ensino de Ciências, formação docente.

NECESIDADES DE FORMACIÓN DE PROFESORES DE CIENCIAS EN ESCUELAS RURALES: UNA INVESTIGACIÓN EN EL SEMIÁRIDO PIAUIENSE

RESUMEN: El análisis de las necesidades de formación del profesorado es esencial para el diagnóstico, la planificación y la toma de decisiones en educación. Estas necesidades pueden definirse como preocupaciones, deseos, faltas y problemas que se sienten y perciben en el proceso de enseñanza, representativos de los valores que surgen en un contexto. El objetivo del trabajo es discutir los resultados de una investigación que buscó identificar las necesidades de formación de docentes de ciencias de escuelas rurales en un municipio del estado semiárido de Piauí entre 2017 y 2018. Para esto, los datos fueron recopilados por medio de formularios, cuestionarios, entrevistas y documentos. Los sujetos que contribuyeron para la investigación son maestros de ciencias y directores de escuelas rurales, maestros y estudiantes de un curso de licenciatura en educación rural con un enfoque en Ciencias Naturales. El análisis enseñó que los profesores de ciencias en las escuelas rurales tenían la necesidad de mejores condiciones de trabajo, de adoptar metodologías de enseñanza no convencionales y de conocimientos específicos de las Ciencias Naturales. Se destaca en los resultados que ellos también tenían las necesidades inconscientes de desarrollar la enseñanza contextualizada y el conocimiento sobre educación rural.

Palabras clave: Educación rural, Enseñanza de ciencias, Formación docente.

INTRODUCTION

Research on the analysis of educational needs began in the late 1960s in the United States (MADAUS; STUFFLEBEAM; SCRIVEN, 1983; FERNANDEZ, 1991). These investigations have become fundamental for decision-making in the Education field, to justify public spending, meet the growing demands for social services and optimize the use of resources (TEJEDOR, 1990). They include analyses of teacher training needs, which are essential for the diagnosis and planning of training processes (RODRIGUES; ESTEVES, 1993), considering the key role of teachers in any changes that may be made in the educational system (LIBÂNEO, 2011). This type of study may produce reflections on the current state of education, which may be used as subsidies for public policies.

Thus, the objectives of this work are to present and discuss the results of a research on the training needs of science teachers in countryside schools in a city[4] located in the semi-arid region of Piauí.

The present study deals with education aimed at the rural population. Thinking about education of the rural population is also thinking about the development of both countryside and city (KOLLING; NERY; MOLINA, 1999). Thus, the development of the entire society can only be planned if it also considers what is produced in the country in economic, social and cultural terms. For this reason, the study of teacher training for the countryside has broader repercussions, going beyond education and the development of the peasant population.

For this population, there is relatively little research on Science teaching (PAZ; USTRA, 2018; SILVA *et al.*, 2019). In addition, no research was found on the training needs of countryside teachers focused on Science teaching. A literature review of papers from the last five years of journals in the Education field, on the platform SciELO [5], indicated three studies on teacher training needs (FÜRKOTTER *et al.*, 2014; PARISOTTO; RINALDI, 2016; SORDI , 2019).

Fürkotter *et al.* (2014) developed a wide-ranging *survey* involving 10 townships in São Paulo state to identify the profile and training needs of municipal teachers, from kindergarten to elementary education. For this, they used a questionnaire, whose data were submitted to content analysis. Their investigation provided subsidies for the determination of relevant aspects for the continuous teacher training. Parisotto and Rinaldi (2016) sought to understand the training needs of teachers in the early years of elementary school in the municipal public school in Presidente Prudente, São Paulo, for teaching their mother tongue. The research involved documentary analysis and application of questionnaires to school administrators and teachers. The training needs emerged from expression of the difficulties faced by teachers, according to their point of view. From the results, themes and guiding content for continuing education actions were outlined. Sordi (2019), through a narrative investigation, analyzed the training needs of teachers for teaching in higher education and to deal with institutional challenges. His work highlighted the potential of institutional spaces to support teaching as a means of meeting the training needs of teachers, especially in their social dimension.

In these studies, the needs were determined based mainly on their own conceptions, within a humanist [6] perspective (RODRIGUES; ESTEVES, 1993). In general, they were considered as knowledge and conditions expressed by teachers in terms of needs related to the difficulties they face in teaching. The data were collected through a questionnaire in two studies and from narratives in one study. Content analysis was used in two studies.

This study may be relevant, in relation to the aforementioned, because it was carried out in the context of Countryside Education and in a city in the Northeast Region. In addition, it started from the dialectical perspective, which understands, through the notion of totality, that training needs are dynamic, contradictory and comprehensive. In this perspective, the problem that guided the research

[4] The city was not identified as a condition for researchers to obtain authorization from the Municipal Department of Education to carry out the investigation, approved by the local Ethics Committee, in the aforementioned public school system

[5] Available at: <http://www.scielo.br/> . Access in: August 10th. 2019.

[6] The name "humanist" was given by Rodrigues and Esteves (1993, p. 23) to the perspective of analysis of training needs centered on the "person to be trained", different from the approaches that privilege the position of the trainer. In that study, authors propose the dialectical perspective, which takes into account the totality, that is, both the person to be trained and the trainer and others interested in the training process, in addition to

was: what are the training needs of Science teachers in countryside schools in a city located in the semi-arid region of Piauí?

The present study is developed as follows: first, it presents the theoretical framework on Rural Education and on training needs; then, it explains the methodological path of the research and exposes the results and discussions, consecutively presenting the final considerations.

COUNTRYSIDE EDUCATION AND RURAL EDUCATION

There are two paradigms that dispute the educational space aimed at the peasant population: Countryside Education and Rural Education.

> The expression "Countryside Education", within the State apparatus, substitutes, even if only partially, the expression "Rural Education", although the latter name remains in official statistics and in most government policies in progress. In the struggle for hegemony, it is commonplace in the practices of elaborating the concept of "Countryside Education" to take the scope of "Rural Education" as a reference to be overcome, theoretically and politically. Indeed, supposedly contrary to the essence of Rural Education, the new conception claims the meaning of universal education and, at the same countryside population (MUNARIM, 2010, p. 11).

Rural Education has been the historically hegemonic educational paradigm in rural areas, characterized by its rectifying, redemptive, urbanocentric and evolutionist perspective (RIBEIRO, 2013). Rural Education is believed to have a rectifying function, that is, to correct the situation of the rural dweller's delay. It is also seen as redemptive to supply the needs of rural population. It is urban-centered, as the model of urban life is treated as the ideal. Rural Education presents an evolutionist conception, since it treats the situation of the peasant as a primitive, non-civilized state, which needs to move to a higher state, the urban one. Consequently, it is decontextualized, once it does not comprehend and does not value, from the countryman perspective, his reality, his life and his work, since it was built by interests outside of him.

On the other hand, Countryside Education, a term that emerged in the late 1990s with the contributions of social movements (CALDART, 2012), is a counter-hegemonic educational paradigm (FRIGOTTO, 2010) and is under the process of constitution, designating the education built with the peasant population. It is an education based on the notion of complementarity between the countryside and the city and on strengthening the peasant identity by creating belonging bonds between the countryside student and the rural context in which he is inserted (BRASIL, 2003). In addition, it is influenced by several pedagogical references, such as movement pedagogy, socialist pedagogy and the pedagogy of the oppressed (CALDART, 2011). With these references, Countryside Education is guided by principles such as: (i) quality education as a right of the peasant population, with respect to their culture, values and knowledge; (ii) education built with respect to community organizations and their knowledge; (iii) organized education in the peasant space; (iv) education that produces a culture mediated by labor on land and for the land; (v) education for sustainable development; (vi) contextualized education, with respect to the heterogeneity of rural people (BRASIL, 2007). Thus, the proposal of Countryside Education is based on a teaching conception built from the perspective and interests of the countryside subject, being anchored in important normative documents (BRASIL 1996; 2002; 2013).

There is a dichotomy in education that occurs in rural areas in our country: two schools, two types of education that represent antagonistic interests and different models of development; one trying to deny the other, in a dialectical contradiction, just as it happens between the interests of the rural elite and representatives of agribusiness, fed by the capitalist system, and the interests of the peasant population, made up of small farmers, riverside dwellers, quilombolas, indigenous people and various types of wage earners linked to rural labor (FERNANDES, 2008). This contradiction between Rural Education and Countryside Education is historical and perceived in the dynamism of educational policies and normative documents, in which sometimes one is favored to the exclusion of the other, sometimes they do the opposite. However, what we have seen is that the victories of Rural Education, hegemonic, are older and ingrained in the Brazilian school culture. This happens, among other reasons, because "the government administers the State only to favor the interests of minority economic and financial groups

to the detriment of public services for the population" (KOLLING; NERY; MOLINA, 1999, p. 49).

Within the perspective of Countryside Education, since the 2000s, the courses of License in Countryside Education (LEdoC) have emerged under the Support Program for Higher Education in Countryside Education (PROCAMPO), from struggles and social claims (MOLINA; HAGE, 2015; MOLINA, 2017). Among more than 40 existing courses, most focus on the field of Natural Sciences, whose purpose is to train educators qualified to work multidisciplinarly in this field of knowledge in elementary and high school in countryside schools (HALMENSCHLAGER *et al.*, 2017).

LEdoCs are regular courses that alternate between two stages of training: University Time, which is when the student, linked to the rural environment, has classes and activities at the university; and Community Time, which is when students perform activities guided by university professors in the community where they live or work (MOLINA, 2015). The main purpose of the alternation between these periods is to integrate university knowledge with peasant knowledge, within the proposal of the Countryside Education paradigm.

TEACHER TRAINING NEEDS

Teacher training needs can be defined as concerns, desires, needs and problems felt and perceived in the teaching process, representative of values arising in a given context (MESA *et al.*, 1990). Therefore, we may say they are dynamic, subject to changes related to the subjects who express them, or to the place or period in which they are considered. Moreover, they can be represented by knowledge or by the "know-how" demanded for the teaching-learning process (CARVALHO; GIL-PÉREZ, 2011).

Training needs may also include unmet and necessary conditions for an individual, group or system to achieve their objectives or a normal working pattern or life (D'HAINAUT, 1979). Thus, they may be seen not only as knowledge, but also as conditions in which teachers build them. In addition, they may refer to people or systems and be private or collective, conscious or unconscious, current or potential (D'HAINAUT, 1979), which evidences their dual and contradictory character (ANTOLÍ; MUÑOZ; RODRIGUES, 2001).

There are several models of analysis of training needs (LOPEZ, 2017). Often, the teachers themselves are used to identify them in the so-called humanist approaches (MESA *et al.* , 1990). However, there are no right models of analysis and methodological choices depend on the objectives and resources available (McKILLIP, 1987; RODRIGUES; ESTEVES, 1993).

Understanding the needs depends on the values, culture, social group studied and the time when they emerge, that is, the context (SILVA, 2000; GALINDO, 2011). Thus, a totalizing perspective is necessary for this type of research, such as dialectics, based on a logic "that reflects the real movement of transformations that take place in the outside, physical and social world" (PINTO, 1979, p. 44). This perspective considers contradictions as the engines of transformations and determinants of the essence of the elements that make up reality in its entirety.

METHODOLOGICAL ROUTE

The present research, conducted between the second half of 2017 and the first half of 2018, sought to use different sources of information and tools for data collection. The study was carried out in one of the central townships of the semi-arid region of Piauí, chosen for being a representative place in the region and where the Municipal Education Secretariat authorized the collection of data in its schools. In the following subsections, regarding the methodological route, details about research subjects, collection instruments and data analysis are provided.

The research subjects

The data were collected with the collaboration of subjects from the groups: Science teachers and principals from countryside schools, teachers and students from a LEdoC[7]. In the results and

[7] Based in the same township as the public school system.

discussion, the subjects are identified by the group, followed by a number, the research tool and the period of information collection so that their anonymity is preserved.

The addresses and contacts of the principals and teachers were provided by the Municipal Department of Education. Based on these contacts, visits were previously scheduled according to the times suggested by the principals and teachers.

The survey was conducted with 11 Science teachers from rural schools (58% of the total), because they are the protagonists of the investigation. The goal was to reach all countryside schools of the municipal network, but not all had Science teachers hired and allocated at the time of visits. Others did not want to participate in the research or did not attend the scheduled days at schools. Teachers were included due to the understanding that their training needs could not be understood without their own expression.

The majority of Science teachers who participated were women and lived in the urban area. Their average age was 38 years old. Regarding education, most of the teachers studied in public and urban schools during basic education. In addition, the majority were graduated in Biological Sciences Degree courses and in public Higher Education Institutions. Almost all subjects had graduate degrees *lato sensu*, with specialization in the field of Education. Regarding professional experience, the teachers had an average of 13 years of teaching in Basic Education, being nine years in the teaching of Natural Sciences. Most are effective employees of the municipality and have weekly workload of 20 hours. The subjects teach an average of 12 Science class hours per week in municipal schools in the rural area. In addition, most Science teachers have more than one job, thus reconciling work in a position in the municipal public network with work in state and private public schools. Teachers, in general, work the curriculum components according to the content and sequence presented in the adopted textbooks, and do not have access to a Science or Informatics laboratory.

In addition, 13 school principals from the rural area (72% of the total) were used as key informants. Collaboration of principals from all schools was not possible, since the principals of some visited schools had not been appointed yet and others were not interested in participating in the research. These subjects were included for representing the interests of the institutions, that is, the schools'. Knowing the institution's side is important in understanding the training needs of Science teachers (BRADSHAW, 1972). At the same time, many of them were or are also teachers, which enables them to better understand how institutional requirements clash with the teacher's reality.

Among the principals surveyed, the majority live in the urban area, are women and over 30 years old. In general, they are effective network teachers chosen and appointed by indication and political affinity. All have higher education, in several fields, and most have experience in school management (starting a second term in school management, not exactly at the same school).

In the city of the visited schools, there is a LEdoC with focus on Natural Sciences, in a public university *campus*. Teachers and undergraduates of this course were selected.

Six teachers from the the LEdoC were considered key informants, because their work aims to train Countryside Educators for the teaching of Natural Sciences. The course adds the objective of meeting the training needs for the teaching of Natural Sciences and Countryside Education. In addition, the teachers of the course, which works on an alternating basis, have Community Time experiencie along with several rural communities, understanding peculiarly the rural communities of the region and the reality of the Natural Sciences teacher in countryside schools within each area, in each school context.

The teachers participating in the LEdoC (50% of the effective and active staff of the course), from different fields, were chosen based on availability and in proportion to the number of teachers in their area. Thus, two pedagogues (out of a total of five), two biologists (out of a total of five), a physicist (out of a total of two) and a chemist (out of a total of two) were interviewed. Five were women and five were more than 40 years old. Only one of them did not have a PhD and they were all veterans and stable, with more than three years in higher education. Although none of the teachers had specific training in the field of Countryside Education, all had academic production in the area - in papers, works published in minutes and annals of events and book chapters -, and had research and/or extension projects in progress.

119 students from the LEdoC participated in the study (78% of the total enrolled students). They were considered key informants for several reasons: (i) due to the social representativeness

(THIOLLENT, 1982) of the people, that is, because they came from the region, had experience in the countryside and in local countryside schools, representing well the rural communities of the area; (ii) knowing the theoretical contributions of Countryside Education (since the subjects of the course's first semester); (iii) for their versatile training in the area of Natural Sciences, which includes the curriculum components of Physics, Chemistry and Biology; (iv) due to the fact many students have had experience in teaching or still acted as teachers (in the most diverse areas), pedagogical coordinators or principals in schools in the countryside schools of the region[8]. From one of the classes, Supervised Internship reports filed and provided by the Course's Internship Coordination were also obtained.

The group of LEdoC students who participated in the research was composed mainly by women (82%). As for the age group, the average age was 30 years old. In addition, 31% of the respondents lived in the city where the *campus* of LEdoC is located. The majority (69%) lived in neighboring cities, all linked to the countryside by their residence area and/or by training and/or work experiences. 59% of the undergraduates declared not to work. Among those who worked, 20% already acted as educators. Also, 31% of the subjects already had another degree.

Tools for data collection

For data collection, the following were used: (i) form, (ii) questionnaire and (iii) interview; which followed the same simple question script, which asked for data on age group, gender, area of residence, academic background, professional experience and the opinion on what would be the training needs of Science teachers in local countryside schools. The data were also collected through (iv) Supervised Internship reports, treated as research documents.

The form, applied to Science teachers and school principals in the countryside, is a data collection instrument that constituted a set of questions filled out by the investigator himself as he observed or received the answers (MARCONI; LAKATOS, 2003). The form was chosen as instrument by the investigators due to the resistance of subjects to the recording of interviews. Its application was made individually in schools, during the break between classes, in the second semester of 2017, during the visitation that was made to 16 schools in the city (out of a total of 27 schools) that offer elementary school II.

The questionnaire was a list of questions generally completed by the respondents without the presence of the investigator (MARCONI; LAKATOS, 2003). The advantage of using the questionnaire is its relative objectivity and potential to allow data collection from a greater number of subjects compared to other techniques. Therefore, this instrument was applied to students of a LEdoC during University Time in the first semester of 2018.

The interview is a recorded interaction, through verbal communication, between two or more individuals (MINAYO, 2009). The interview is an appropriate technique to obtain deeper information about a person, such as representations, feelings, expectations, difficulties, ways in which training needs are manifested (RODRIGUES; ESTEVES, 1993). Through this instrument, the university professors of a LEdoC were heard in the second half of 2017.

The research was complemented with the analysis of documents (CELLARD, 2008). The internship reports of the Supervised Internship curriculum component, prepared by students of the LEdoC, were analyzed as documents. In this sense, reports were selected from a group of 22 students who did the observation and conducting of internship in Science classes in elementary school II, distributed in ten countryside schools in the second semester of 2017. In these reports, the undergraduates recorded data of schools and supervising teachers, as well as their inferences regarding what was observed in class and their experience in conducting, contributing with data on local teaching working conditions and teaching practices of Science.

As explained in the previous paragraphs, in addition to obtaining data from the Science teachers themselves, these were also collected through key informants (school principals, teachers and

[8] The LEdoCs were implemented to also meet the needs of educators working in countryside schools without university training, something common in the Brazilian rural context. Despite this, there were students from the LEdoC who had degrees in Pedagogy, Biological Sciences and other areas. It is common to have principals, in the municipal network of the research context, without university education, appointed based on political ties.

students from a LEdoC), that is, people who had knowledge about a specific studied community, being able to provide subsidies for the understanding of their educational[9] needs (RODRIGUES; ESTEVES, 1993).

Data analysis

In view of so much data collected, it was essential to choose an analysis model. The text of Creswell (2008) was used as a reference for the establishment of the following substeps: (i) exploration, (ii) coding, (iii) hierarchy and (iv) representation.

In the exploration step, the transcripts of the interviews, the responses to the questionnaire and the forms and texts of the internship reports were read. The transcriptions went through a process of textualization, to eliminate the characteristics of orality that would make them difficult to be understood. During reading, we sought to identify the training needs of Science teachers in countryside schools.

Coding was a process of segmentation (dividing the text into excerpts) and marking the text to identify the training needs pointed out by science teachers and key informants. In this step, the words and expressions that represented them were marked.

In hierarchy, there was establishment of relations between the training needs identified, relating the most general and the most specific so that they could be grouped.

The frequency criterion, expressed in percentage[10], mentioning the training needs of Science teachers in countryside schools to establish an order of presentation was used, as in Rodrigues and Esteves (1993). *Excel* software was used for statistical calculation and making of spreadsheets and graphs in the study.

The analysis was complemented with theoretical elements from the Bakhtin Circle, given its dialectical character, to enrich the dialogue between the data collected and the theoretical framework (VOLÓCHINOV, 2018; BAKHTIN, 2016). Thus, concepts as discourse, statement, discourse genre, dialogism and polyphony (SILVA, 2013), among others, were important for the analysis of statements and their correlation with contexts and ideologies behind the paradigms of Rural Education and Countryside Education.

RESULTS AND DISCUSSION

In this section, we will first present the training needs pointed out by the several groups of subjects participating in the research. Then, we will highlight those that come closest to the Countryside Education paradigm.

Main training needs pointed out

Science teachers from countryside schools who participated in the survey, when asked about their training needs, mentioned only: better working conditions (91%); adoption of unconventional teaching methodologies (73%); and specific knowledge in the area of Natural Sciences (73%). However, the key informants mentioned, in addition to these, other needs such as the contextualization of teaching and knowledge about Countryside Education - as shown in Table 1, with the percentages of responses, where n represents the total of informants of each group.

[9] In this conception, science teachers can be considered key informants. In the present study, however, subjects who are not part of the group of Science teachers in countryside schools, but who are familiar with their work, such as school principals, students and teachers, are considered as key informants. a LEdoC.

[10] Although the samples of LEdoC teachers, school principals and science teachers can be considered small for statistical treatment, this was adopted for comparison between groups and with the larger group, made up of LE0C students , as in the studies reported by Rodrigues and Esteves (1993).

TABLE 01. Training needs of Science teachers according to key informants.

Training needs of countryside school Science teachers	Countryside school principals (*n* = 13)	LEdoC Undergraduates (*n* = 119)	LEdoC Teachers (*n* = 6)
Know how to do a contextualized teaching	46%	89%	83%
Adoption of unconventional teaching methodologies	69%	33%	100%
Specific knowledge of Natural Sciences	15%	34%	83%
Knowledge about Countryside Education	0%	36%	17%
Better working condition	62%	9%	50%
Did not opine	23%	0%	0%

Source: Research data (2018).

The contextualized teaching refers to the one starting from the reality of countryside students, although the polysemy of the term is recognized in the academic literature (KATO; KAWAZAKI, 2011). Non-conventional teaching methodologies were described by key informants and Science teachers as those that go beyond lectures, such as teaching with interdisciplinary projects, teaching with research, problem-based learning, teaching-as-research, the use of new digital information and communication technologies, didactic games, group dynamics and practical classes, especially Science experiments. The specific knowledge in the field of Natural Sciences, mentioned by the key informants and by Science teachers, were varied, such as knowledge about botany, biotechnology, solar energy, energy sources, healthy eating, sexuality, solid waste treatment and current Science themes broadcast by the media, something that students see on *internet* and on television and bring as a question to the classroom. The knowledge on Countryside Education, mentioned only by the key informants, refers to the foundations, principles and history of struggles that surround this educational paradigm. The allusions to better working conditions, presented by key informants and science teachers, were related to the need for Science laboratories, more space in the school to carry out educational projects and resources such as books, technological resources and materials for conducting Science experiments. Also on better working conditions, the need for continuing education was mentioned, in addition to infrastructure and teaching resources.

The training need for knowledge on Countrysidel Education was only mentioned by subjects linked to the LEdoC. A relevant result of this work is that key informants pointed out more training needs than Science teachers in Countryside schools, which highlights the importance of the dialectical perspective. Two needs were not pointed out by Science teachers: knowing how to develop contextualized teaching and knowledge about Countryside Education. Due to the proximity of these needs to the Countryside Education paradigm, focused on a teaching contextualized to the countryside reality and a teacher training that considers the peasant peculiarities, they are the focus of the following discussions.

Training need of knowing how to teach contextualized Science

As for the need of knowing how to teach contextualized Science, the following excerpts, taken from answers of some informants, were representative:

> Teachers need to work on everyday issues: water, garbage collection, dengue, for contextualization. (School principal 02, Form, 2017).

> Should be aimed at countryside people, something that has to do with the everyday life of the rural area. (Student of LEdoC 41, Questionnaire, 2018).

> Contextualized, privileging the countryside subjects, respecting their characteristics, socializing and implementing methods so that the student of the countryside school feels part of the processes and has a guarantee of teaching that will contribute to their formation. A formation more focused on the reality of the countryside school, which approaches the conditions and the reality teachers will meet in countryside school. (Student of LEdoC 67, Questionnaire, 2018).

> [...] all methodology should start with the subject's life context [...] we live in a capitalist system that prevents an individualized service. Massification prevents the teacher from treating the student individually, which is a principle of quality education [...] starting with the subject's life context. Teaching should begin with the exploration of what the student lives, what the student thinks about the place where he lives and the experiences that the he has lived in that place, mainly related to nature. (Teacher of LEdoC 03, Interview, 2017).

LEdoC's teacher and students use common terms such as "countryside", "reality" and "subject" when referring to contextualization. The words and the fact they are related in the same course focused on Countryside Education characterize these speeches as the result of dialogical interactions, that is, even if these speeches are not in the context of a direct dialogue between interlocutors, as concrete recipients, they dialogue with each other and dialogue with other speeches spoken or written in the field of Countryside Education. They also associate contextualization with "training" or "education". Thus, contextualization is linked, in both statements, not only by a common vocabulary, but also by common objectives, approaching the same discursive genre (BAKHTIN, 2016).

Statements of the subjects about the need for local Science teachers to carry out contextualized teaching are consistent with the discussions on the Countryside Education paradigm. The historical building of the Countryside Education concept "called the school and its professionals to dialogue with the countryside reality and its social subjects, to build a differentiated school and contextualized in the life, work and culture of people" (MOLINA, 2006 , p. 90). These people, in fact, are peoples, which are characterized by a diversity of groups and places, whose life, work and culture account for knowledge. In this sense, to contextualize, in teaching, is to provoke dialogue in the dialectical relation between this knowledge and the systematized knowledge. As Freire expressed (2013, 2013, p. 31):

> For this reason, right thinking evokes the duty, both in the teacher and the school, of not only respecting the knowledge with which the students, especially those from the popular classes, arrive - knowledge socially built in community practice - but also, as for over thirty years I have been suggesting, discussing with students the reason for some of this knowledge in relation to the teaching of content.

Therefore, the creation of this dialogue by the teacher in Science education is a way of showing respect for the student's knowledge and, finally, for his life, work and culture.

In addition, contextualizing is taking something from the student's daily life, with which he is familiar, as a starting point for teaching through the establishment of relations, such as associations and comparisons (LIMA; PAULA; SANTOS, 2009). The relations for anchoring new knowledge to existing knowledge are conditions for meaningful learning (AUSUBEL; NOVAK; HANESIAN, 1980). However, contextualization, more than a starting point, should enable the development of social, cultural and productive activities in rural areas, along with critical reflection and application of systematized knowledge to local problems to intervene in them, providing an exchange of knowledge between two poles: the academy and the rural community (LIMA, 2014; LEITE; RADETZKE, 2017). For this, contextualization must encompass more than the methodological dimension, also crossing the historical and socio-environmental dimensions (GONZÁLEZ, 2004).

The fact Science teachers did not mention this need reflects their unconsciousness about it. According to D'Hainaut (1979), there are unconscious needs, as the subjects do not always realize what they really need for their training and for the performance of their work. They often lack maturity and knowledge for this (RODRIGUES; ESTEVES, 1993). In a study on the training needs of Science teachers in the Ibero-American context, the following was recorded:

> When a teacher in training or in practice is asked to express his opinion on "what we, Science

> teachers, should know - in a broader sense of 'knowing' and 'knowing how to do' - so that we can perform our task and address satisfactorily the problems that it poses to us ", the answers are, in general, quite poor and do not include much of the knowledge the research highlights today as fundamental [...] We can, thus, come to the conclusion that we, teachers of Sciences, not only lack adequate training, but are not even aware of our shortcomings (CARVALHO; GIL-PÉREZ, 2011, p. 14).

Therefore, Science teachers are not always aware of their training needs, which makes it relevant to diversify information sources.

The lack of mention of contextualization in teaching by teachers reveals the existence of a teaching practice unrelated to the reality of their students, which was corroborated by the analysis of the observation reports of the interns. Therefore, some interns have reflected:

> The teacher must create common everyday situations of the student's life, and use them in the classroom to approach scientific knowledge. (Student of LEdoC 11, Supervised Internship Report, 2017).

> There was lack of contextualization in the teacher's classes [...]. (Student of LEdoC 10, Supervised Internship Report, 2017).

Thus, contextualization is not present in practice, although, theoretically, for more than 20 years, the National Curriculum Parameters point to its importance in teaching, not only for students in the rural area, but in all contexts (BRASIL, 1997). According to Cortez and Darroz (2017), contextualization, contradictorily, is not a concrete reality in Brazilian school environment. For this to happen, the teacher must also be an investigator of social practice, natural wealth, local and regional environmental problems, work, interests, culture, values and knowledge of the rural communities he serves. Once knowing the students' reality, the Science teacher may have the necessary resources to problematize and provoke reflection on it.

The unawareness of Science teachers regarding the need for contextualized teaching in the rural environment is evidence of their lack of connection as the counter-hegemonic paradigm of Countryside Education.

Training need of knowledge on Countryside Education

Regarding the need of knowledge on Countryside Education, some subjects expressed:

> First, the fundamentals of Countryside Education I believe are not yet well grounded, especially in this training, because the Degree in Countryside Education is very recent. So, teachers who teach Natural Sciences in countryside schools do not have the theoretical and methodological foundation of Countryside Education proper to the field of knowledge [...]. (Teacher of LEdoC 05, Interview, 2017).

> A training with objectives aimed at the countryside subjects [...]. (Student of LEdoC 31, Questionnaire, 2018).

> Different instructions from the urban area are necessary, that is, they need to improve their knowledge in the rural area, as well as what is happening to us. Our course teaches how to be a countryside teacher for countryside students. (Student of LEdoC 32, Questionnaire, 2018).

The need for knowledge on Countryside Education was mentioned only by key informants linked to LEdoC, its teachers and students. It is an understandable fact, since they are part of the same group in which such knowledge, in the form of speeches, circulates (BAKHTIN, 2016). This finding also indicates these speeches have not reached the scope of Science teachers and principals in local countryside schools, pointing out a contradiction between theory and practice. Although the concept of Countryside School has been developed over 20 years ago and is present in official documents, it is unknown or not considered by educators working in rural area in the practice.

This need was also pointed out by Alencar (2015) in his study with teachers from a school in

an agricultural settlement. He concluded that, despite the development of Countryside Education under the banner of social movements, the teachers investigated by him were immersed in an educational reality and in a formation outside this issue, a contradictory situation of a school built in a settlement originated from a social movement of rural workers. Therefore, one of his notes states that "countryside educators need to have opportunities for specific continuing education in countryside education" (ALENCAR, 2015, p. 57).

Recognition of the need for knowledge about Countryside Education requires recognition of the peasant's situation of oppression (FREIRE, 2013). In order to recognize and overcome this oppression, an education that starts from concrete aspects of the needs felt by the peasants is necessary (PACHECO, 2017).

The knowledge about Countryside Education emerges from the reality and needs of the peasant people, which, therefore, must be apprehended. It involves familiarization with their pedagogical eclecticism and knowledge arising from the relation with social movements and from the recognition and appreciation of social and cultural diversity, expressed through work, culture, struggles and peasant ways of life. Therefore, knowledge is intertwined not only with the theory arising from the countryside educational practice, in school spaces, in the most diverse places, and present in texts from books, periodicals and works presented in academic events. It is also intertwined with the social knowledge produced at work, on the land, in traditions and social movements. This knowledge was not found among Science teachers at local countryside schools, who, at no time, used the expression "Countryside Education". It can also be seen in its statements:

> [Science teaching] is normal both in countryside and city (Science Teacher 10, Form, 2017).
>
> The difference [between urban and rural schools] is made by the teacher. I always try to do the same activities, works, tests, in the rural as well as in the urban area. (Science Teacher 11, Form, 2017).
>
> I believe that there is not much difference [between rural and urban schools] [...]. (Science Teacher 05, Form, 2017).

According to the statements above, for Science teachers, teaching in the countryside and in urban areas has no difference, that is, there is no distinction between them, which places their point of view under the paradigm of Rural Education. The urbanocentric perspective is shown in the statements through the preposition "how": the countryside school as in the city, the teacher in the countryside as in the city, the teaching of Natural Sciences in the countryside as in the city, the student in the countryside as in the city. This perspective is present in several ways: teaching planning, methodology and teaching materials used, types of assessment, etc. Thus, it is natural for young people in the countryside, in the city studied, to complete basic education in the city. In this context, according to the report of interns, young people from the countryside do not like to be identified as "from the countryside". In addition, the planning and teacher training sessions are joint and the guidelines for teachers in countryside schools are the same for teachers in the urban area. Another example is the textbook. All schools, in urban and rural areas, adopt the same book collection. Therefore, Science teachers from the countryside and from the city use the same textbook, which is often the driver of teaching planning (DELIZOICOV; ANGOTTI; PERNAMBUCO, 2011).

> The textbook is not suited to the countryside reality. The images and language are distant from a rural reality, and do not develop concepts and reflections about the countryside context [...] The images and pictures presented in the book do not dialogue with the reality experienced by countryside students and the teacher does not seek to contextualize the contents of his classes. (Student of LEdoC 19, Supervised Internship Report, 2017).
>
> Such book [Science textbook] is not adapted to countryside schools. This material, which has clarity, simplicity, some illustrations and images, conceptual language, presents a proposal for problematization. It also contains exercises and suggestions to be worked on in each content, but it is aimed more at urban schools (most of the examples mentioned in the book are geared towards big cities, thus escaping the reality experienced by countryside students). Thus, the

> Science teacher tries to bring, in the best possible way, examples focused on the reality of the school's students, so that the student understands the content more clearly and has greater learning. (Student ofLEdoC 18, Supervised Internship Report, 2017).

Thus, the interns observed the "distance from rural education in relation to the reality of work, life and culture of students in rural schools" (RIBEIRO, 2013, p. 177). The centralization of teaching in the textbook only reinforces this situation, since "the vast majority of didactic materials available in schools is decontextualized. Therefore, it does little to carry out a pedagogical work in a perspective that involves the geoenvironmental aspects of the semiarid" (LIMA; MENDES SOBRINHO, 2008, p. 155).

The treatment given to countryside education, as it is not different from the education occurring in the urban environment, is something conveniently ignored, that is, seen as something natural, as the words "always" and "normal" in the statements of Science teachers 10 and 11 imply. This is a characteristic of the ideology power, i.e., making a thought seems normal, natural, permanent, unquestionable, in short, as something that everyone believes and should be believed in (VOLÓCHINOV, 2018; GIROUX, 1997). The speeches also show the influence of the hegemonic ideology that inspires Rural Education, coming from the dominant classes, from those who are interested in a school that produces for capital, for the formation of surplus labor in the cities and for the industrialization of the countryside. Seen as natural or ignored, this ideology escapes consciousness and manifests itself in the discourse as something indisputable, natural, which goes unnoticed. According to Volóchinov (2018), ideology manifests itself in language. The naturalization of urban education in the countryside and the absence of Countryside Education in the discourse of Science teachers of countryside schools are indications they were cut short by the ideology that underlies the Countryside Education paradigm. Knowledge about Countryside Education emerged from social movements, but no relationship was seen with local countryside schools. On this subject, some Science teachers said:

> I work only as a teacher [...] I have no connection with social movements. (Science Teacher 10, Form, 2017).

> If there is any movement, I have never heard [...]. (Science Teacher 02, Form, 2017).

Therefore, the is a distancing from social movements, which is a loss, given its pedagogical character for the production and diffusion of knowledge about Countryside Education (CALDART, 2012). In this sense, school education that takes place in the countryside, in the context of research, apart from the knowledge that countryside social movements produce and under the aegis of an urban-centered educational administration, is unlikely to develop an identity with Countryside Education.

The activities of some local social peasant movements and their communication with rural workers take place mainly through radio and social networks, especially with small affiliated farmers. Interactions with them take place in the context of union assemblies and other events promoted by social movements, often distant from the school space. In addition, the majority of Science teachers, based on the forms' data, do not live in the countryside, which intensifies this physical, social and cultural distance, since their associations, extra-school activities and identity are more connected to their place - the city. Thus, the communication barriers and the home situation of most Science teachers makes difficult for them to partner with social movements, which in turn distances the teaching of natural Sciences from the knowledge of Countryside Education.

FINAL CONSIDERATIONS

The present research allowed us to verify that Science teachers from countryside schools of the study present the following training needs: better working conditions; adoption of unconventional teaching methodologies; specific knowledge in the area of Natural Science, but, especially, developing contextualized teaching and knowledge about Countryside Education.

From the data, we notice there are similar views regarding training needs, showing that groups from the same context tend to have similar opinions, which is shown through statements that can

be labeled over the same discursive genre, as a characteristic spectrum, indicating shared values and ways of life.

There is a contradiction between the normative documents and social practice (from the statements, reports of interns, direct observation at visitations, etc.), in which the rights of teachers and countryside schools, although guaranteed, are not really met. Another contradiction is seen between the Countryside Education paradigm, defended in academy through LEdoC, and the hegemonic paradigm of Rural Education, rooted in municipal rural schools.

Traditional Science teaching in countryside schools through banking, bookish and classificatory education, is practiced under distancing of teachers from the principles and foundations of Countryside Education. Thus, the greatest lack perceived is not of infrastructure or material resources, but of critical reflection and its consequence: a transformative spirit. There is a formative need of awareness to transform the school and overcome the Rural Education paradigm.

For Science teachers of countryside schools, this research shows they need the contribution of other actors, involved and interwoven with their work, in defining what they really need with regard to training. In terms of Countryside Education, the need of its proximity to social movements became evident. As critical and transformative intellectuals, teachers need to be collectively involved in social struggles for an education built by countryside workers, since they are organically part of that class.

For educational research, this study contributes to bring out more discussions about the importance of teaching Natural Sciences in Countryside Education and the role of teacher training in this field. Countryside Education is important for the whole society, as the countryside and the city are part of the same totality, and a development project must include everyone, with all his diversity.

Locally, the research data are relevant in the sense of providing subsidy for teacher training programs in countryside schools. That said, there is an urgent need to plan training processes, in the form of continuing education, aimed at contextualized teaching and at the discussion and critical reflection on the theoretical contributions of Countryside Education. These formative moments can also be occasions to promote enriching meetings and bring the school, especially the teachers, closer to Higher Education Institutions, the community and the peasant social movements.

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