

Hegemonies and Resistances in Environmental and Science Teacher Education

María Angélica Mejía-Cáceres ¹
Laísa Freire ^{II}

Abstract: This article argues that the production of monographs can produce new discourses in the curricula of science and environmental education for pre-service teacher education based on emancipatory approaches. We rely on critical discourse studies to understand the relationship between hegemony and emancipation in pre-service teacher education. Twelve monographs of environmental education published between 2015 and 2018 were analyzed. We found some monographs under hegemonic visions of environmental issues such as management, procedural time, mitigation of responsibility, and the search for efficiency. On the other hand, we found other monographs that referred to the struggle, resistance, denunciation, community, and inclusion of popular masses instigating insurgent practices. Likewise, hybrid discourses have constituted discourses in the monographs, which is typical of late modernity. Finally, we propose non-hegemonic ways to include environmental issues in pre-service teacher science education.

¹ Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brasil.

^{II} Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brasil.

Keywords: environmental education, pre-service teacher education, critical discourse analysis, hegemonic, emancipation

São Paulo. Vol. 25, 2022

Original Article

DOI: <http://dx.doi.org/10.1590/1809-4422asoc202000086r3vu2022L3OA>

Introduction

Science education (SE) and environmental education (EE) have not escaped educational policies that respond to hegemonic directions of the global structure of control, which determined the geographical distribution of each of the forms integrated in world capitalism (QUIJANO, 2000), as well as colonizing aspects of the north that Lander (2005) calls the Western civilizational crisis. The crisis occurs either through the epistemic reproduction of knowledge, educational practices or the translation of policies in contexts totally different from their origin, aspects that influence the conception, valorization and practice of education. Hence, it will be materialized in national/regional educational policies, educational programs, educational materials, and educational practices within the class (GUTIÉRREZ, 2014), which contribute to reproducing that colonization. Individuals are influenced by and are under hegemonies in educational practice that often contribute to educational practices that reproduce and do not transform social injustices. However, we recognize how educational institutions and individuals have agency capacity (SCOTT, 2008), thus managing to reconstruct norms and/or convictions that influence their educational practices (LESSARD; CARPENTIER, 2016). Therefore, changing processes and developing emancipatory practices by the subjects depends on their capacity for agency.

Stevenson (2007) identifies how the work and educational cultures of Western countries have resulted from the forces of economic globalization and neoliberal policies, a nonhomogeneous impact given the historical, political and cultural characteristics of each context. However, we emphasize that Latin American countries can reproduce what other countries have done, leading to the devaluation of the ancestral knowledge of indigenous communities (e.g., QUIJANO, 2000). Colombia has reproduced a policy of standardization and a centralized curriculum in traditional content areas, such as mathematics, biology and chemistry, as a result of the reproduction of the English curriculum, which was predefined through the national curriculum and external exams (STEVENSON, 2007). Despite the Brazilian curriculum not following the neoconservative perspectives of England specifically, it responded to the logic of instituting principles of business competition between institutions and professionals (LOPES, 2006).

Additionally, we characterize the international guidelines on ESE (environmental and sustainability education) based on environmental problems and the effects on the development of society. These guidelines have been interpreted and translated in each country in accordance with the interests of the governments, in Colombia; for example, they developed the national policy of EE (2012). In that country, the design of school environmental projects was established as mandatory for elementary and middle schools, and EE was incorporated into pre-service teachers in science education (MEJÍA-CÁCERES et al., 2021).

In this context, our study presents an analysis of a Colombian experience in pre-service environmental and science teacher education. The curriculum has suffered external and internal regulations, resulting in some hegemonies of the field in which it is immersed [we understand hegemony as an intervention of power on subjects and other dimensions, either coercively or with consent through cultural and ideological

direction (GRAMSCI, 1984)]. It involves overvaluation of scientific knowledge over pedagogical and didactical knowledge, as well as knowledge of EE¹ (FEYEBERABEND, 1970; BONNET, 2013), lack of knowledge and/or devaluation of EE as a new field of knowledge different from the field of SE (GUIMARÃES et al., 2006) and a struggle with the alienation generated by the economic dominance (MEJÍA-CÁCERES, 2019; WALSH et al., 2014) in the curriculum.

EE in higher education

The research's context is very particular, since it articulates EE and science teacher training to the same degree. Research in the area explains these relationships in different ways. However, the studies have common concerns regarding the incidence of the environmental field in teacher education and the formation of identities. Miceli (2017) affirms that science education appropriates the environmental discourse, representing forms of the environment that structure society according to the values and interests of a positivist science (although the field is heterogeneous and with different disputes).

Freire, Figueiredo and Guimarães (2016) observed that the construction of the identity of the environmental educator occurs beyond the higher education of environmental educators, and many times, this construction is related to experiences that are not disciplinary nor formal spaces of learning. Various authors (e.g., TOZZONI-REIS, 2001) have observed needs in teacher education processes, since despite recognizing that professional performance goes through theoretical–methodological training linked to a critical and transformative stance, practice does not always suppose transformation of the hegemonic.

As limitations in EE research and practice fields, we can highlight the educational processes based on hegemonic and conciliatory discourses, which are configured by moderate environmentalism (JATOBÁ et al., 2009). Likewise, we can highlight that, in field research, there is a gap in the understanding of aesthetic and affective issues (PAYNE et al., 2018) as postcritical proposals (ANDRADE et al., 2020) of resistance to hegemonic environmental discourses and EE.

The North–South epistemological debate about environmentalization of the curriculum in teacher education is discussed by the ACES² network. Although we will look for a position from Latin American perspectives and challenges, there is a dynamic panorama of global agreements and local–global relations that are present in the environmental field and must be recognized in EE research. In this article, we are mainly concerned with two premises in this dialogue with critical discourse studies: (i) despite the external and internal hegemonies of teacher education, there are causal powers according to the agency that can generate points of rupture, resistance or emancipation (BHASKAR, 1986); and (ii) monographs, as communication events, are elaborated within the education process

1 - We refer to scientific, pedagogical, didactic and environmental knowledge as a consequence of the curricular organization of the degree, which are the names of his curricular components.

2 - ACES (Curricular environmentalization of higher Studies).

and can discursively represent cultural and political expectations of the students in their research committed to social change while addressing a social/educational problem beyond the prescribed curriculum.

Critical Discourse Analysis (CDA) as a theoretical–methodological framework

A dimension that constantly appears when thinking about education is knowledge, and as we discussed earlier, there are different types of knowledge, such as scientific, pedagogical, and didactic, among others. For Van Dijk (2010), “knowledge is defined in terms of beliefs, commonly accepted on the basis of legitimate (socially sanctioned) criteria in a community” (p. 175). This implies accepting that epistemic communities have their own sociocultural terms to validate knowledge that will be shared socially.

Considering that our context of study is a bachelor’s degree, in which science education and EE converge, we find it interesting to identify knowledge management in the educational discourse. Specifically, we are interested in how students after ten (10) semesters of the educational process focus on scientific knowledge (as evidenced in the curricular structure corresponding to Resolution 047 of 2002 and Resolution 118 of 2009 issued by the Academic Council of the Universidad del Valle) amid dialogues with pedagogical, didactic and socioenvironmental knowledge. In other words, we are interested in bringing together and debating issues relevant to explain how the power and abuse of power in knowledge management, materialized in monographs, becomes evident, or if, on the contrary, communicative events generate spaces/voices of insurgencies.

From CDA, the social component can be incorporated into the linguistic component. In addition, the analysis allows discussing whether there is reproduction or maintenance of power and studying its social consequences related to educational practice, in our case, monographs as events that can address aspects of poverty or social inequality in research processes. We understand monographs as texts that “can be the object of critical investigation when they contribute, directly or indirectly, to the reproduction of illegitimate domination in society, as is the case, for example, from racist or sexist language” (VAN DIJK, 2010, p. 179).

The monograph, understood as a communication event, will allow us to identify the context in which it is created. It is the represented mental structure of the social situation as produced by the student: ongoing actions, participants, and institutional roles of other communicative events (at school, community, neighborhood). However, it is expressed through a textual and academic discourse, as is the monograph’s style, conditioned by power negotiations with the student’s counselor about what should be and should not be included in the monograph (VAN DIJK, 2000).

CDA reveals not only power issues but also resistance and struggle. We understand that social actors with power, conditioned by social structure, can generate control over communicative events and communication situations. One possible example is when the Ministry of National Education (MEN) conditioned educational practices and valorized certain communicative events. In addition, in the educational process, an example is

the overvaluing monographs associated with “hard” sciences such as physics, biology and chemistry and not EE, which can promote certain ideologies, social attitudes and knowledge in students.

According to the above, “discourse is understood as a communicative event” (VAN DIJK, 2013), and its analysis requires considering the triad: cognition, discourse and society. The cognitive dimension can be studied through situation models, knowledge, and ideology. The textual dimension can be studied from the analysis of presuppositions, modalities, metaphors, assertions, denials, and speeches, among other aspects. In addition, the social dimension can be studied through the analysis of the inclusion or exclusion of social actors (VAN DIJK, 2016). In our analysis, we address the sociocognitive aspects by identifying themes and ideological mobilization within the monographs, the textual dimension by identifying assertions in relation to our hegemonic or emancipatory categories of analysis, and the social dimension by the identification of the position, or not, of the student with an active agency amid the other social and institutional actors.

However, we clarify that although the study of the content, themes, propositions or other lexical items is directly related to beliefs, attitudes and ideologies, this relationship is not always evident, nor does it always occur (VAN DIJK, 2013).

Pre-service teacher education in natural sciences and EE: Attacks on its autonomy

When reviewing the guidelines and the sociohistorical context of the degree, we found a juncture of curricular change from 2015 to 2017. As a result of the MEN establishing new mandatory guidelines, the autonomy of the degrees in the country was violated. Such was the case with Resolution 02041 of 2016, which established the names of all bachelor’s degrees in the country and led to modifying the name. In our case, it was the “Bachelor’s Degree in Basic Education with Emphasis in Natural Sciences and EE”, replaced by “Degree in Natural Sciences and EE”, through Resolution 071 of 2016, which also generated the modification of the training objectives and components.

The four components that structured its curriculum were also modified. Initially, the components according to the 2009 resolution were socioenvironmental, scientific, pedagogical and didactic; the new components, according to the 2016 resolution, were general fundamentals, specific and disciplinary knowledge, pedagogy and didactics of disciplines.

This involved the transformation of the curricular structure, updating the academic program, and establishing new program objectives. In Table 1, we take from the previous structure only those disciplines that refer to EE and compare them with those of the current structure of the socioenvironmental component. We found a reduction in subjects, from seven (7) subjects that were equivalent to an EE of five (5) semesters to two (2) subjects that are equivalent to two (2) semesters, without forgetting that those seven (7) subjects were considered professional. In other words, they had the objective of deepening EE knowledge (RESOLUTION 118, 2009).

Table 1- Comparison of EE disciplines

	Curricular Structure 2009	Curricular Structure
Component	Socioenvironmental	Didactics of the disciplines
Course or Subject	History and EE	Fundamentals of EE
	Landscape Culture	
	Environmental Problems I	
	Environmental Problems II	Environmental projects
	EE and Sustainable Development	
	School environmental projects	

Source: MEJÍA-CÁCERES (2019)

The table above shows how curricular modification favored a reduction in EE in the training curriculum, loading and valuing a conception where the knowledge of the natural sciences dominates over other knowledge areas. This means that the degree program is still based on a conception of traditional science that refers to understandings related to scientific practices. According to the Next Generation Science Standards (NGSS), scientific investigations use a variety of methods, scientific knowledge is based on empirical evidence, and scientific knowledge is open to revision, in light of new evidence, models, laws, mechanisms, and theories that explain natural phenomena (LEDERMAN, NG; LEDERMAN, J. S, 2019). This also shows evidence of a conception of EE that is included within science education, and not as a different field of knowledge, which may have an association relationship (MEJÍA-CÁCERES, 2019). Although two disciplines of the environmental component were left, i.e., “Fundamentals of EE” and “school environmental projects”, this reductionism is part of the devaluation of EE knowledge, thus contributing to fragmentation and not to transit among the different pieces of knowledge, scientific, popular and traditional, and thus allowing the broadening of the vision of the environment and capturing the multiple meanings that social groups attribute to it (FREIRE; RODRIGUES, 2020).

Corpus of insurgency communicative events

The communicative events analyzed are the monographs, which according to Corona (2015) “constitute an essential part of a scientific research process, for the systematic explanation of realities (theoretical or not), using different documents” (p. 66). The communicative event, the monograph, is conditioned according to the group members, in this case, the science and EE pre-service education teachers at the Universidad del Valle (public), and the social acts carried out and/or proposed by the pre-service education teachers as part of the group. Additionally, the context-social structure, situations of discursive interaction, for example, activities carried out in schools, personal and social cognition, and teachers in training have knowledge and opinions resulting from their

training process (VAN DIJK, 2000). This indicates that although monographs are also made in other degrees, they will be different from each other, whether they are made in the same university or other contexts. In addition, the constraints generated in the writing process are linked in cases such as the Universidad del Valle to research processes that allow dialogue between a university professor and a future professor.

For the data collection, the OPAC catalog (Online Public Access Catalog) of the Universidad del Valle was used. The search criteria were: keyword EE, period (2015-2018), type of publication (graduate work), and library (CENDOPU Documentation Center of the Institute of Education and Pedagogy).

Fourteen (14) monographs were found, of which for ethical reasons, two (2) monographs were excluded due to conflicts of interest with one of the study authors. The 12 included monographs were organized and subsequently coded in Table 2:

Table 2- Monographs of the bachelor's degree for analysis

Title	Code
Designing an educational process in environmental education on rainwater channel's management in the Pondaje sector, Comunas II at the IE Humberto Jordán Mazuera-Miguel Camacho Perea headquarters.	2015-A-MCS
Characterization of environmental education practices and models of a sample of primary school teachers.	2015-B-MCS
Design of an environmental project based on the problem of the Middle Basin of the Cañaveralejo River.	2015-C-MCS
The attention and their interpretation of the written press to global environmental problems	2015-D-LAG
Proposal for methodological strengthening in environmental education for the environmental physics course at Universidad del Valle.	2015-E-RVO
An educational booklet proposal that illustrates the coal mining problem in the Meléndez River in Cali.	2016-A-MCS
A sociocultural view of environmental education.	2016-B-MCS
Community environmental education strategy: curricular design proposal for the development of citizen environmental education projects (PROCEDAS).	2016-C-JBM
Environmental management in the classroom: a possibility to build non-violence scenario.	2016-D-DCG
EE didactic proposal for the Quintín Lame indigenous agricultural EI of the Tacueyó reservation.	2017-A-MCS

A reflection of the complex problem of mining and its implications in the Colombian context.	2017-B-MCS
Environmental education an option to transform mining practices in Istmina Chocó.	2018-A-MCS

Source: MEJÍA-CÁCERES (2019).

For monograph analysis, we mainly relied on the information given in the summaries. However, in some cases, due to a lack of information, we needed to read inside the monograph. This analysis was carried out in two moments: the first moment had the objective of identifying in the discourse the presentation of social actors, their themes, their valorization and the agency of the monograph; and the second moment identified the preestablished categories of analysis on hegemony and emancipation, and finally the implicit relationship between EE and SE. These category analyses were based on positivist and critical epistemological currents. The deductive categories of related words, with discursive formations considered hegemonic in relation to educational processes in EE, were efficiency, quality, management, individuality, procedural time³, manipulation, racial insults and mitigation of responsibility. The categories of related words, with probably emancipatory discursive formations in relation to educational processes in EE, were transformation, collectivity, denunciation, struggle/resistance, mutable and dynamic time⁴, popular masses, collaboration, and dialogical cultural action.

Considering that ideology is a semiotic instrument in power struggles, we designed Table 3, called “Some Ideology Expressions in the Discourses of EE Monographs”, in which the categories of analysis were organized: social actor-context, where the individuals or groups, organizations or institutions that make up the social situations were identified, or in some cases, the scenarios of those social situations in which they carried out the proposal were identified; topics, which refers to the discourse of “what do you want to talk about” in the social situation; the thematic evaluation category, where the valuations that the authors of the monographs are giving to the subject are classified; agency, where it is intended to identify the ability to act; science education–EE relationship, in which it is identified whether it is a relationship of association or inclusion of the two fields of knowledge; and EE as political action⁵, to identify if there are elements of emancipation, participation or international politics.

3 - We understand procedural or linear time as a series of consecutive events in a single direction. It is associated with the concept of progress.

4 - We understand that time can have different periods. They can have modified during the processes. Then, to build and understand a period, they can recognize the past, present and future from a prospective attitude.

5 - This category implies a conception of critical environmental education, which it leads to “debate, criticize, problematize and/or create opposition actions on hegemonic discourses, evaluate, support, oppose, address emancipatory and transformative content” (MEJÍA-CÁCERES, 2019).

Thematic interests and participating social actors

Table 3 shows the social actors that were identified with an active agency in the monographs. In some cases, we find specifications such as “5th-, 6th-, 7th-, or 9th-grade students”, or specific disciplines, such as the case of the environmental physics course, or a specific educational institution; in other cases, we find generalizations such as teachers, students, educational institutions, and community. Regarding the topics, we found that most are focused on environmental problems, such as the management of the rainwater channel, problems associated with rivers, mining extraction and environmental management, which allows us to interpret that a greater percentage of the monographs are related to an EE with a conservationist current, where conservation behaviors must be adopted and skills related to environmental management must be developed. We also identified a direct relationship with the topics addressed in the Environmental Problems I and Environmental Problems II subjects; although we also identified monographs associated with the sociocultural context.

In this sense, to understand the interest that moves the majority of students, it is necessary for us to explain its context. The degree that was the subject of analysis is located in Santiago de Cali-Colombia, a city that is characterized by having seven (7) rivers that cross it (Río Cali, Río Cañaveralejo, Río Pance, Río Meléndez, Río Lili, Río Cauca, Río Aguacatal), of which three are in the vicinity of the university, without neglecting the approximately 20 lagoons and lakes in the city. This contextual element is linked to different possibilities of reading, according to the theoretical-ideological reference that we have; e.g., in a reading from an economic ideology, the rivers would be understood in a cost-benefit relationship, but a decolonial reading would allow us to recognize the cultural relations of the context, allowing us to bring collective memory, not only because they are contexts of ethnic-racial oppression but also because they open paths of other thoughts and a re-emergence of practices understood pedagogically (WALSH, 2013).

In relation to the above, as we see in Table 3, we find five (5) monographs that refer to the problems of the Cañaveralejo River, two (2) of the Meléndez River, one of Charco Azul Lake and one in relation to the rainwater canal that in one way or another is also related to the impacts on rivers. Some of these monographs bring a critical reading to extractivism practices such as mining (2016-A-MCS), a reading on the relationship of the river with social vulnerability, as is the case of human settlements (2015-C- MCS), or examples of the need for a social struggle to transform the reality of the environment and of the excluded communities, but at the same time, they are pedagogical scenarios where the participants exercise their pedagogies of learning, relearning, reflection and action (WALSH, 2013, p. 29).

Others related to an institutional context (school, university), the media (the press), or other regional contexts, such as the Tacueyó indigenous reservation community and the mining problem in Istmina, Chocó. These last two, recognized as actions that change the order of colonial power, on developing monographs in institutional contexts, previously approved by the university agreements, include institutions from other regional and, therefore, cultural contexts that correspond more to the students' interests and identity.

Regarding the evaluation category, which indicates that it can be desirable and undesirable, as well as what values the author is committed to (VIEIRA; RESENDE, 2016), we found positive evaluations, assuming the theme as interdisciplinary (1), an educational resource, (1) or an educational alternative (3) and negatively as an environmental problem or impact (5), reductionism (1), or loss of cultural identity. Some of these valuations justify the reason for selecting the theme to be worked on, as is the case of the negative evaluations, since they consider, for example, that there is poor management of the rainwater channel, or they consider coal mining in the Meléndez River as a serious socioenvironmental problem, and since these problems exist, it is necessary to build the proposal. On the other hand, some of the positive evaluations are made with the interest of valuing their proposal by including “interdisciplinary” themes. In both cases, we find that, for this, they use chains of reasoning to justify that evaluation and narrate what happened, which is a typical strategy of the symbolic construction of rationalization to generate legitimation, which is a mode of ideological operation.

Monographs and agency

Returning to the monograph as a communicative event, we understand that it is conditioned according to its identity, role, and relationships. Teachers in science and EE training at Universidad del Valle are authors in discourse and authors of a curriculum. Thus, they act as agents who can contribute to social transformation, which implies discussing the political dimension of everyday life, given that the monographs are the result of the subjective motivations that teachers in training have for individual and collective participation.

Therefore, we understand the monographs as that possibility of work where the subjects can connect with important problems (DEMOLY et al., 2018). This is reflected in Table 3 and our analysis. We found that most of the problems addressed in the monographs correspond to the contextual realities of the neighborhood, in more local terms, or of the city in which the students live.

Agency is another term that we need to discuss. López (2004), based on Giddens, Bourdieu and other theoretical reviews, understands it as “the ability to act (agency) not as an individual property, but as a possibility (to be able to do) shared. This implies linking the capacity for action with a relational conception of power” (p. 15). This author also links agency with ethical–political commitment and responsibility as a semiotic construction and subversion. In this context, the agency of the monographs was identified (see Table 3), as some proposals were found with the aim of promoting the development of scientific skills, the design of strategies, materials, educational proposals, providing meaningful information, or improving didactic processes, while others more about inquiry through observation, interviews and questionnaires.

We sought to identify the agency or capacity for action among pre-service teachers, finding that they called themselves promoters, observers, designers, managers, and analysts to provide information, documents, and reports (MEJÍA-CÁCERES, 2019). Although these monographs were part of a context in which science predominates, they

aimed to contribute to social transformation through the dissemination, denunciation and educational proposals design. In addition, an association relationship between science education and EE was identified, with the exception of four monographs from 2015 that establish an inclusion relationship between science education and EE and the idea that EE must respond to science education guidelines, such as the basic standards of competencies or the inclusion of a disciplinary course such as physics.

In the following fragment, it is possible to identify how the subjects, as in this case of the pre-service teacher in an educational process through the monograph as a communicative event, have an agency for the defense of ancestral knowledge:

“The Nasa indigenous community, based on its indigenous educational system, seeks to rescue the wisdom and knowledge of its ancestors. To maintain cultural identity in all generations, so that in this way they assume the vision of being, thinking and feeling of the Nasa indigenous concerning the environment, which consists of the respect and protection of nature, considered mother, which is linked intimately to their lifestyle” (2017-A-MCS, p. 11).

The rescue of the “knowledge of the ancestors” helps to fight against the depersonalization of nature, such as, for example, the river. For Krenak, this is important because “when we remove their senses from them, considering that this is an exclusive attribute of humans, we are freeing those places so that they become waste from extractivist industrial activity” (2019, p. 49).

Table 3 Some ideology expressions in the discourses of the EE monographs

Monograph	Social actor/context	Topic	Evaluation of the theme		Agency	Relationship SE-EE	EE as political action
			Positive	Negative			
2015-A-MCS	5th-, 6th- and 7th-grade students	Management of the rainwater channel	Unmentioned	Environmental problems	Promote the development of scientific skills, citizenship and values	Inclusion	Participation
2015-B-MCS	Teachers Students	EE	Interdisciplinary	Unmentioned	Observation interviews questionnaire	Inclusion	Unmentioned
2015-C-MCS	Educational institutions near the river	Cañaveralejo river basin	Unmentioned	Environmental problems	Design of different methods and transversal and interdisciplinary strategies to the curriculum	Inclusion (basic science standards)	Participation Emancipator
2015-D-LAG	Newspaper Tiempo	Environmental issues in the press	Unmentioned	Reductionism	Provide information	Association	Participation
2015-E-RVO	Environmental Physics Course	Environmental problems in the Meléndez River	Use for teaching physics	Unmentioned	Improve the methodological and didactic aspects of the course	Inclusion	Unmentioned
*2016-A-MCS	Community the Buitrera	Coal mining extraction present in the Meléndez River	Unmentioned	Serious environmental problems	Design primer, contribute to education	Association	Participation
2016-B-MCS	Community that lives in the Charco Azul sector	Sociocultural perspective in EE	Educational alternative	Unmentioned	Design an educational proposal framed in the problem of human settlements in the Charco Azul sector in Santiago de Cali	Association	Emancipator
2016-C-JBM	Community at large	EE community	Educational alternative	Lack of educational guidelines	Intervene pedagogically in community	Association	Unmentioned

2016-D-DCG	9th-graders	Environmental management	Educational alternative	Unmentioned	Propose some theoretical–methodological elements	Association	Participation
2017-A-MCS	Nasa indigenous community seventh grade of the E.I. Agropecuaria Indígena Quintín Lame	Cultural identity	Unmentioned	Culture loss	Develop complementarity between ancestral knowledge (culture) and scientific knowledge, in such a way that the vision of being, thinking and feeling of the Nasa indigenous people in relation to the environment is assumed	Association	Participation
2017-B-MCS	Marketing (hides the socioenvironmental consequences)	Mining	Unmentioned	Impacts and socioenvironmental problems	Document the problem of mining in Colombia, to warn of the damage to natural resources, in the social, health and economic sectors	Association	Participation
2018-A-MCS	Tenth-grade students of the Gustavo Posada Peláez Agricultural Institution	The effects of mining on natural resources in Istmina Chocó	Unmentioned	Negative impacts	Unmentioned	Association	Participation

Source: From Mejía-Cáceres, 2019.

Therefore, this possibility of working through the monograph may be aimed at reproducing or transforming hegemonic dimensions, since we consider that educational processes are political processes that mobilize ideologies, and this is also materialized in discursive practices.

The monographs have in common the strategy of the ideological operation of legitimation. It implies making use of rationalization to give legitimacy; hence, we find citations where the author is placed to speak, giving him the responsibility of the affirmation or denial, or citations are used to justify the need for their work. For example, monograph 2015-C-MCS begins its problem as a response to the need identified by the MEN, to develop transversal pedagogical projects:

“The MEN of its Educational Quality Policy Strategies: contemplates training for citizenship through the strengthening and expansion of transversal pedagogical programs and the Citizen Competencies program. The Transversal Pedagogical Projects were established in art. 14 of Law 115 of 1994 are EE, Sexual Education and Human Rights (education for justice, peace, democracy, solidarity, fellowship, cooperation and the formation of human values)” (2015-C-MCS, page 22).

In this sense, the MEN is a social actor that contributes to giving “value” to the proposal of the monograph, which consists of addressing the problem of the Cañaveralejo River based on a transversal design in the curriculum of an educational institution.

In other cases, also to legitimize, narration was used in such a way that explaining the past can help to understand the present. An example is the monograph 2016-C-JBM:

History has shown us how industrial activities allowed this change in population density, generated by the movement that people made to urban areas, to be participants in the social and economic changes of the time, which in turn generated also a change in the conception of the city. In addition, the industrial advances that were forged, from the second industrial revolution, not only generated new processes in the production map, but also generated new processes in environmental deterioration; however, these changes began to be questioned and their impact recognized. Currently, our cities have (...) (2016-C-JBM, p. 11).

This survey of the modes of operation of ideology allows us to understand that the educational discourse does not escape from ideological processes or from intertextual relations, whether direct or indirect. We also found that the discourse style of the monographs corresponds to an academic style, which is characterized by being explicit, in most cases, these intertextual relationships through citations. Additionally, the monograph’s elaboration has to do with the social structure (political guidelines) that regulates the pre-service education of teachers. This could be seen in the loss of autonomy of the degrees, where the approval of the career is limited to the approval of a monograph, ignoring another type of development, such as the design of a classroom plan, the systematization

of their teaching practice process, or another textual genre. Being linked to the structure and production of scientific knowledge gives a status of value to the professional who completes a higher course.

Reproduction or insurgency practices in EE

We highlight two ideas. The first refers to the fact that there are processes of the construction of hegemony and struggles against hegemony within the educational field (GRAMSCI, 1981); the second refers to the fact that the social actors that participate in this field can act, that is, they have agency (LESSARD et al., 2016; SCOTT, 2008). Therefore, we searched within the monographs for whether their dimensions are hegemonic or emancipatory. In this context, Table 4 organizes the monographs by hegemonic, emancipatory and hybrid discourse categories.

The discourses associated with hegemonic categories are commonly related to the institutionalization and practices linked with the dominant and hegemonic segments. In other words, education is at the service of neoliberalism through a linear link between education and development. According to Morales (2000), the official speeches of EE are based on anthropocentric and naturalistic visions, as well as on superficial reforms based on technicalities and sustainable development (VELÁZQUES, 2014). In this sense, management is taken as a basic element in the resolution of environmental problems, directed more by an economic sense than by a social transformation; in turn, this perspective ignores the social differences and the problems generated by the capitalist system; therefore, there is reductionism in responsibility for problems at the individual level. This implies a representation of the environment as a resource; as a result, the objective is environmental management, as well as campaigns and specific activities carried out with “sufficient” efficiency to solve the problem.

On the other hand, the monographs that refer to the struggle and resistance discuss and problematize the role of the economic system and its impact on the environment to denounce and recognize the roles of the different social actors of a community; we consider them emancipatory categories because, as indicated by Stortti et al. (2020), considering other knowledge insurgencies as a form of transgression of an imposed Euro-centrist pattern allows a transformative praxis and reflexive action.

Table 4- Description of hegemonic and emancipatory categories

Hegemonic categories	Management, procedural time, mitigation of responsibility (that is, emphasizing individual responsibility and not collective responsibility, or that of a government), efficiency.	2015-A-MCS, 2015-B-MCS, 2015-E-RVO, 2016-C-JBM.
Emancipatory categories	Struggle, resistance, changing and dynamic time, denunciation, community, inclusion of popular masses.	2015-D-LAG, 2016-A-MCS, 2016-B-MCS, 2017-A-MCS, 2017-B-MCS, 2018-A-MCS,

Hybrid discourses	Management, collectivity and community.	2015-c-MCS, 2016-D-DCG,
--------------------------	---	-------------------------

Source: Mejía-Cáceres (2019).

In the hegemonic category, we find the monograph 2015-A-MCS, which refers to a management model and the linear educational structure, and the problem found is done with a mitigation of responsibility. The monograph 2015-B-MCS also refers to the management of recycling from the perspective of individuality, although a school environmental project is proposed. We also find the monograph 2015-E-RVO, where there is an individualistic approach and it assumes procedural time. The monograph 2016-C-JBM uses words such as effective resolution, which refers to efficiency and strategy, thus referring to management.

In the emancipatory category, we find that the monograph 2015-D-LAG uses the word combat, which is synonymous with struggle and resistance. It also points to critical awareness and escapes process time by referring to three specific times, “before, during and after”, thus approaching a prospective that means they understand that time is mutable and dynamic. Monograph 2016-A-MCS uses words such as evidence and recognize, which are equivalent to denunciation and collectivity, thus indicating the community, similar to monograph 2017-A-MCS, and monograph 2017-B-MCS alludes to struggle and resistance through confrontation, participation and denunciation. The 2016-B-MCS monograph points to social transformation and includes excluded populations such as Afro-Colombians and the displaced, and 2018-A-MCS circumscribes the Raizal communities and aims to show or, in other words, denounce.

We consider the 2015-C-MCS monograph as a hybrid discourse, since it refers to individuality and the inclusion of environmental management in education but also indicates the community and the collectivity through educational institutions by cultural change as a social transformation. In turn, the 2016-D-DCG monograph makes a hybrid discourse by referring to environmental management and teamwork (collaboration) and community (collective).

Proposals for non-hegemonic spaces in the monographs

We saw how some of the monographs have in common the search for possibilities; according to Vieira (2018, p.317), “the justification for the deconstruction exercise is to understand other possibilities of the human being to relate to nature, expanding the debate in and for the EE. Possibilities that are based on involvement with the world constituted in place”. This means that students can rethink relationships with the world through acts of creation and recreation both in nature and in cultural reality. What allows us to return to Freire (2020) is when he tells us that education is authentic when it develops the ontological impetus to create, and that is where the monograph can allow the development of a critical consciousness, which allows “transforming reality” through

creative activity.

In this context, we bring as examples the monographs 2016-A-MCS and 2018-A-MCS. They refer to mining extraction, which implies at first analyzing reality, to understand it, then raising hypotheses about the challenge of that reality and seeking solutions (FREIRE, 2020). Among these solutions, the authors identified dialogue as a key element, the dialogue between the knowledge of the existing community and that made vulnerable by extractivist actions, and scientific knowledge to carry out an interdisciplinary conceptual construction. This also requires a deconstruction of its territory, where according to Vieira, “the place understood as a territory of event, in which there is an existential thread between being and space, and in which a multiplicity of experiences occurs, which propitiate an involvement in an ethical relationship, expressed by a rooting between the human being and the earth” (2018, p. 318). This deconstruction of the territory is because geographical spaces are made up of culture, and the transformations of reality depend on the actions of the human being, remembering that education is not an adaptation because it would limit the possibilities of action (FREIRE, 2020).

The 2017-A-MCS monograph makes a reconnection between the knowledge of the memory of the territory and the recovery of the relationship with the body, culture and nature (FERRERA-BALANQUET, 2017) by inquiring about cultural knowledge that encompassed the spiritual, the native language, and cultural practices in relation to medicinal plants, unlike other monographs that focused more on preestablished biological and social knowledge, lacking recognition and gratitude for the knowledge made invisible by colonialism. Therefore, the 2017-A-MCS monograph that addresses the indigenous community, the 2016-B-MCS monograph that includes Afro-Colombians and the displaced, and the 2018-A-MCS monograph that includes Raizal communities trace paths of coloniality, since decoloniality is based on critical interculturality (MENEZES et al., 2019).

Therefore, we highlight the monographs as an unveiling of the other, allowing an otherness, a disinterested exchange of technologies between different cultures, and a reunion between bodies of knowledge. The monographs can allow a dialogue in a horizontal relationship from a critical matrix, but nourished by love, humility and hope, they allow that encounter between consciences, motivated by the analysis of the mediation of the world, a world that is transformed and humanized by the human being (FREIRE, 2020).

Conclusions

Considering that the monographs are immersed in a historical context with its political particularities, we understood the influence of the State through curriculum reforms and the loss of autonomy by universities, thus allowing debate and reflection about power relations, alienation generated by the capitalist system and the role of monographs in the curriculum as forms of insurgencies.

Additionally, we recognize that, despite being a bachelor’s degree with an emphasis in both natural sciences and EE, a privilege prevails in the sciences, the result of colonizing research-doing, as evidenced by prioritizing the disciplines of the scientific component

in the curricular restructuring, and that was discussed in relation to the conception of traditional/positivist science. This colonization responds to the impositions given by the MEN to the materialized decision-making of teachers, e.g., in curricular restructuring, as well as in students who research using methodologies rooted in colonial practices.

However, as seen in most of the monographs, there is an association relationship between EE and SE. In addition, we observed some conceptions of EE over time toward a critical perspective, in contrast with the curricula lost in the environmental component, being, therefore, a limitation for the emergence of emergencies and possibilities of emancipation within the degree. However, despite reproducing colonial practices, there is an epistemological limit that is designed and makes us question the field; in this sense, it is important to reread the monographs that seek to break with imposed structures, which are inclusive and can be the basis to search for decolonial processes. Recognizing this process invites us to think about the construction of future monographs from the concept of agency as possible scenarios to generate rupture, resistance or emancipation in science and environmental education in pre-service teacher education.

In this sense, new methodologies should be promoted within the undergraduate curriculum. We propose a generative dialogue (FREIRE; RODRÍGUES, 2020) with “escrivencia” proposals, where Black communities are mobilized in an aesthetical way from the written texts (QUEIROZ, 2017) and self-performance is used as a decolonial pedagogical practice (CHÁVEZ, 2017) to recreate the stories of indigenous and Afro-descendant communities through which strategies for decolonization are provided. Thus, the senses, sensoriality and sensitive life that allow individuals to displace the ideological hegemony of visibility (FERRERA-BALANQUET, 2017) can be reimagined.

Finally, the article contributes as an empirical reflection about non-hegemonic possibilities in the curriculum, not as disciplinary spaces but rather in different places and times in experiences of teacher formation. These spaces could be addressed by research activities at universities that contribute and involve the dimensions of teaching, in this case translated into monographs. However, this process is not definitive or without tensions and demands constant epistemological vigilance from professors and researchers in higher education.

Acknowledgment

This work was carried out with the support of FAPERJ (Programa Jovem Cientista do Nosso Estado processo - SEI-260003/006898/2021) and CAPES – 001, CNPq, process number 148873/2016-2.

References

ANDRADE, C., FIGUEIREDO, T., BOZELLI, R., & AUTOR (2020). Marcos de teorías poscrí-

ticas para repensar la investigación en educación ambiental: la experiencia estética y la subjetividad en la formación de profesores y educadores ambientales. *Pensamiento Educativo. Revista de Investigación Educativa Latinoamericana*, 57(2), 1-17.

BHASKAR, R. **Scientific Realism and Human Emancipation**. London: Verso, 1986.

BONNETT, M. Normalizing Catastrophe: Sustainability and Scientism. *Environmental Education Research*, v. 19, n. 2, p. 187–197, 2013.

CHÁVEZ, D. Notas para corazonar la performance como una práctica pedagógica decolonial. En: Walsh C. **Pedagogías Decoloniales: Práctica insurgentes de resistir, (re)existir y (re) vivir**. Tomo II. Quito: ABYA YALA. 2017.

CORONA L. J. Uso e Importancia de las monografías. *Revista Cubana de Investigaciones Biomédicas*. 31 (1): 64-68. 2015.

COLOMBIA. (2012). **Política Nacional de Educación Ambiental**. Ministerio Nacional de Educación, Ministerio de Medio Ambiente.

CONSEJO ACADÉMICO DE LA UNIVERSIDAD DEL VALLE. Resolución 047 de 2002. Colombia, 2002.

CONSEJO ACADÉMICO DE LA UNIVERSIDAD DEL VALLE. Resolución 118 de 2009. Colombia, 2009.

DEMOLY K; DOS SANTOS, J. Aprendizagem, Educação Ambiental e Escola: Modos de enagir na experiencia de estudantes e professores. *Ambiente & Sociedade*. São Paulo. 21. 2018.

FERRERA-BALANQUET. R. Pedagogías Creativas Insurgentes. En: Walsh C. **Pedagogías Decoloniales: Prácticas insurgentes de resistir, (re)existir y (re) vivir**. Tomo II. Quito: ABYA YALA. 2017.

FEYERABEND, P. **Consolations for the Specialist**. In: LAKATOS, I.; A, M. (Eds.). *Criticism and the Growth of Knowledge*. Cambridge University Press, 1970.

FREIRE, P. **Educação e Mudança**. 42 ed. São Paulo: Paz & Terra, 2020.

FREIRE, L.M, FIGUEIREDO J.; GUIMARÃES, M. O papel dos professores/educadores ambientais e seus espaços de formação. Qual é a educação ambiental que nos emancipa? *Pesquisa em Educação Ambiental*. Vol 11, n. 2. 2016.

FREIRE, L.M; RODRIGUES, C. Formação de professores e educadores ambientais: diálogos generativos para a práxis. *Revista Pesquisa em Educação Ambiental*. Vol 15, n1. 1 2020.

GRAMSCI, A. **Cuadernos de la Cárcel**. Tomo1. México: Ediciones Era, S.A, 1981.

GRAMSCI, A. **Cuadernos de la Cárcel**. Tomo 3. México: Ediciones Era, S.A, 1984.

- GUIMARÃES, M.; VASCONCELLOS, M. DAS M. Relações entre Educação Ambiental e Educação em Ciências na Complementaridade dos Espaços Formais e Não Formais de Educação. *Educar*, v. 27, p. 147–162, 2006.
- GUTIÉRREZ L. La Trascendencia del Banco Mundial en la Ley General del Servicio Profesional Docente: Elementos para el Análisis. *Diálogos sobre educacion*. 9, julio-diciembre. 2014.
- JATOBÁ, S., CIDADE, L., & VARGAS, G. Ecologismo, ambientalismo e ecologia política: diferentes visões da sustentabilidade e do território. *Sociedade e Estado*, 24(1), 47-87. 2009.
- KRENAK A. *Ideas para Adiar o Fim do Mundo*. São Paulo. Companhia de letras. 2019.
- LANDER, E. Ciências sociais: saberes coloniais e eurocêntricos. In E. Lander (Ed.), *A colonialidade do saber. Eurocentrismo e ciências sociais: perspectivas latino-americanas* (pp. 21–54). Buenos Aires: CLACSO. 2005.
- LEDERMAN, N.G., LEDERMAN, J.S. **Teaching and learning nature of scientific knowledge: Is it Déjà vu all over again?** *Discip Interdiscip Sci Educ Res*, 1, 6 (2019). <https://doi.org/10.1186/s43031-019-0002-0>
- LESSARD C.; CARPENTIER A. **Políticas educativas: A aplicação na prática**. Editores Vozes: Petropolis. 2016.
- LOPES, A C. Quem defende os PCN para o Ensino Médio? In LOPES, AC & MACEDO, E (org.). **Políticas do currículo em múltiplos contextos**. São Paulo: CórteX, pp.126-158. 2006.
- LÓPEZ J. **Del Sujeto A La Agencia (A Través De Lo Político)**. *Athenea Digital*, n.6, p.1-24. 2004.
- MEJÍA-CÁCERES, M.A; HUÉRFANO, A; REID A; & FREIRE L. Colombia's national policy of environmental education: a critical discourse analysis, *Environmental Education Research*, 27:4, p. 571-594, 2021.
- MEJÍA-CÁCERES, M.A. **De las Estructuras Sociales a los Eventos Comunicativos: Formación Inicial de Profesores de Ciencias y Educación Ambiental en el Contexto Sociopolítico colombiano**. NUTES: UFRJ. 2019.
- MINISTERIO DE EDUCACIÓN NACIONAL. Resolución No 2041 del 2016. Colombia, 2016
- MINISTERIO DE EDUCACIÓN NACIONAL. Resolución No 071 del 2016. Colombia, 2016
- MENEZES, AM.; CHIARA S; FERREIRA J.; PELACANI, B; STORTTI M; SÁNCHEZ, S. Educação Ambiental desde el Sur: da ruptura com a perspectiva colonial em busca e outras relações sociedade-natureza. En: Monteiro, B; Dutra, D.; Cassiani, S.; Sánchez, C.; Oliveira R. (org). **Decolonialidades na educação em ciências**. Editora Livraria da Física. 2019.
- MICELI, B. **Discursos sobre água nos livros didáticos de ciências do 6º ano do ensino fundamental**. 2017, 106 f. Dissertação (Mestrado em Educação em Ciências e Saúde) - Núcleo de Tec-

nologia Educacional para a Saúde, Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2017.

MORALES, A. **Processo De Institucionalização Da Educação Ambiental: Tendências, Correntes E Concepções**. VII Enpec- Encontro Nacional De Pesquisa Em Educação Em Ciências. Resgatado de: <http://www.fep.if.usp.br/~profis/arquivos/viienpec/VII%20ENPEC%20-%202009/www.foco.fae.ufmg.br/cd/pdfs/1167.pdf> 2000

QUEIROZ, A. **Geo-Grafias Insurgentes: Corpo E Espaço Nos Romances Ponciá Vicêncio E Becos Da Memória De Conceição Evaristo**. Tesis: Universidad Federal de Goiás. 2017

QUIJANO, A. **Colonialidad del poder, eurocentrismo y América Latina**. Argentina. 2000

SCOTT, W. **Institutions and Organizations: Ideas and Interest**. 3ed. Thousand Oaks: Sage. 2008.

STEVENSON, R. B. Schooling and Environmental/Sustainability Education: from Discourses of Policy and Practice to Discourses of Professional Learning. **Environmental Education Research**, v. 13, n. 2, p. 265–285, 2007.

STORTTI, M. SANCHEZ, C.; JIMÉNEZ, L.; SILVA, R.; ALMEIDA, E.; HIDALGO, R.; MELO, A.; PELACANI, B; FERREIRA, C. Diálogos Insurgentes entre Educação Ambiental e Culturas no Encontro Pesquisa em Educação Ambiental (EPEA). **Pesquisa em Educação Ambiental**, vol.15, n.1, 2020

PAYNE, P, RODRIGUES, C., CARVALHO, I., FREIRE, L. M., AGUAYO, C. & IARED, V. G. Affectivity in Environmental Education Research. **Pesquisa em Educação Ambiental**, 13 (Especial), 93-114. 2018.

TOZZONI-REIS, M. Educação Ambiental: referências teóricas no ensino superior. **Interface-comunicação, saúde e educação**, São Paulo. v. 5, n. 9, p. 33–50, 2001.

WALSH C. **Pedagogías Decoloniales: Prácticas insurgentes de resistir, (re)existir y (re) vivir**. Tomo I. Quito: ABYA YALA. 2013.

WALS. et al. Convergence between science and environmental education. **Science**. Vol 344. 583-584. 2014.

VAN DIJK, T.A. Critical Discourse Analysis. In: Schiffrin, Tannen, Hamilton. **The Handbook of Discourse Analysis**. Oxford: Blackwell Publishers. Pp. 352-371. 2000.

VAN DIJK, T.A. Discurso, Conocimiento, Poder y Política. Hacia un análisis crítico epistémico del discurso. **Revista de Investigación Lingüística**, nº 13. P 167-215. 2010.

VAN DIJK, T.A. Análise Crítica do Discurso Multidisciplinar: Un apelo em favor da diversidade. **Linha d'Água**, n 26 (2). p. 351-381. 2013.

VAN DIJK, T.A Análisis Crítico del Discurso. **Revista Austral de Ciencias Sociales**, n. 30, p. 203–222, 2016.

VELÁSQUEZ M. El discurso hegemónico ambiental a través de organismos de cooperación y su influencia en las relaciones internacionales. **Revista Científica General José María Córdova**, v. 12, n. 13, p. 191-202. 2014

VIEIRA, V. C.; RESENDE, V. M. Análise de discurso (para a) crítica: o texto como material de pesquisa. Campinas: Pontes, 2016.

María Angélica Mejía-Cáceres

✉ mariaangelicamejiacaceres@gmail.com

ORCID: <https://orcid.org/0000-0003-3486-1952>

Submitted on: 28/05/2020

Accepted on: 07/02/2022

2022;25:e00863

Láisa María Freire dos Santos

✉ laisapa@gmail.com

ORCID: <https://orcid.org/0000-0002-4573-0969>

Hegemonias e Resistências na Formação de Professores em Educação em Ciências e Educação Ambiental

María Angélica Mejía-Cáceres
Laísa Freire

Resumo: Este artigo argumenta que o desenvolvimento de monografias pode produzir novos discursos nos currículos de formação de professores de Ciências e Educação Ambiental, a partir de abordagens emancipatórias. Por meio dos estudos críticos do discurso buscamos entender a relação entre hegemonia e emancipação na formação de professores. Doze monografias de Educação Ambiental foram analisadas, correspondentes ao período de 2015 e 2018. Encontramos nas monografias discursos a partir de perspectivas hegemônicas da questão ambiental voltadas ao gerenciamento, tempo de processo, mitigação de responsabilidades e busca por eficiência; por outro lado, foram encontradas monografias que se referem à luta, resistência, denúncia, comunidade e inclusão de massas populares que instigam práticas insurgentes. Da mesma forma, discursos híbridos aparecerem nas monografias, o que é característico da modernidade líquida ou tardia. Por fim, propomos caminhos contra-hegemônicos da questão ambiental na formação de professores.

São Paulo. Vol. 25, 2022

Artigo original

Palavras-chave: educação ambiental, formação de professores, análise crítico do discurso, hegemonia, emancipação.

Hegemonías y Resistencias en la Formación de profesores en Educación en Ciencias y Educación Ambiental

María Angélica Mejía-Cáceres
Laísa Freire

Resumen: Este artículo argumenta que el desarrollo de monografías puede producir nuevos discursos en los currículos de formación de profesores de Ciencias y Educación Ambiental, a partir de abordajes emancipadores. Nos basamos en los estudios críticos del discurso para la comprensión de la relación entre hegemonía y emancipación en la formación de profesores. Fueron analizadas 12 monografías de Educación Ambiental realizadas entre 2015 y 2018. Se encontraron monografías elaboradas a partir de visiones hegemónicas de la educación ambiental como la gestión, el tiempo procesual, la mitigación de la responsabilidad y la búsqueda de eficiencia; por otro lado, se encontraron monografías que hacían referencia a la lucha, a la resistencia, a la denuncia, a la comunidad y a la inclusión de masas populares instigando prácticas insurgentes. A sí mismo, discursos híbridos han constituido discursos en las monografías, lo que es propio de la modernidad líquida o tardía. Finalmente, proponemos caminos contra hegemónicos de lo ambiental en la formación de profesores.

São Paulo. Vol. 25, 2022

Artículo original

Palabras-clave: educación ambiental; formación de profesores; análisis crítico del discurso; hegemonía, emancipación.