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THE CARTOGRAPHIC LANGUAGE IN THE TEXTBOOKS OF HIGH SCHOOL GEOGRAPHY IN BRAZIL

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The practice of mapping or using maps for location, spatialization of phenomena and for defining territories is not only a feature of contemporary societies; on the contrary, this practice comes from a long time. This context made the map to be used by the most different areas of knowledge and not only for the exclusive use of geographical science.

This relationship between cartographic language and geographical science manifests itself most strongly when we look back at the teaching of geography, more specifically for the didactic materials that are designed for the teaching of geographic content and school activities. It is not uncommon to find in these didactic-pedagogical actions the use of the most distinct cartographic products to contribute to the explanation of geographical knowledge.

Thus, in this paper we will analyze how the cartographic language is present in the geography textbooks produced for high school in Brazil. This investigation will take place around two collections approved by the National Textbook Plan (PNLD) of 2018. We have the perspective that this study will provide us with an overview, even if synthetic, of how cartographic language is used in these materials, recognizing their potential and potential. at the same time its limits.

As we pointed out at the beginning, maps are a constitutive part of geographical science and thus, as a consequence, of the teaching of geography. But after all, what is a map? We can start from the premise that there is not at first a universal definition of what a map would be. There are different ways to construct a map, according to its object, the phenomenon represented or its intentionality.

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According to Martinelli (2017, p. 23), "the history of cartography in the classroom followed the very history of the affirmation of this knowledge, confirming the teaching and learning of the discipline". Harley (1991, p. 07) proposes a broader definition of the map, being the "graphic representation that facilitates the spatial understanding of objects, concepts, conditions, processes and facts of the human world". In this argument one notices a change of paradigms and the search to expand something that was already intrinsically universalized. This demonstrates that the need for the map to be understood from the historical and social context that was produced and, subsequently, enabling its analysis.

We can highlight that these changes in the understanding of what is a map contributed for the cartographic language to be thought beyond its technical norms or with a product restricted to the reading process of its users. That is, the practices related to its construction process were strengthened to enhance a more conscious and critical use of the map. An example of this was in the Brazilian curriculum, when from the National Curriculum Parameters (PCN) (Brazil, 1998) there was significant importance to the contents and cartographic language from elementary school to high school, and this should be seen as the understanding of relevance of Cartography to the intellectual and cognitive formation of the students.

We must understand these elements within a teaching-learning process, which begins in Brazil in the 6th grade of elementary school, when students have a more structured contact about the basic elements of cartography, and which develops until the last year of high school., at which time more complex themes will be approached and that will require students to master reading and the construction of cartographic language. When we refer to the basic elements of cartography we are highlighting essential factors for the construction of a map, which according to Martinelli (2017) are: title, legend, orientation, geographical coordinates, scale, source and language itself.

All these elements are considered as cartography contents that should be worked in the classroom, however, with the due care by the teachers not to condense them in just one stage of the school formation. Given that these contents will enable teachers to use cartography in another very important aspect, which is cartographic language.

The fact that the map is used beyond content is also highlighted by Richter (2017, p. 279) in saying that "it is not enough simply to be present, it must become a resource that contributes to the social practices of individuals, from the reading process to the proposals for its construction ". It is these elements present on the map that characterize it as a potent language for the teaching of geographic contents.

When we refer to cartography as a language, we are also talking about the use of the so-called alternative cartography, or as Girardi (2012) names in his work - alternative maps. According to the author "in the context of cartographic products, the meaning

given by the“ alternative ”as a noun tends to be stronger in our imagination, carrying the map to a domain of social combat” (Girardi, 2012, p. 41). Thus, we characterize here alternative maps as those with a more political and social character, which take into account the phenomena often to the detriment of the Euclidean metric.

Thus, it is necessary to conceive that geographic contents and cartographic language are inseparable elements in the construction of knowledge and of geography classes. It is not possible for the student to understand certain content from cartographic language if they have not previously learned cartographic content, and it is of no use to know cartographic content if maps are used solely for the sole purpose of locating phenomena. It is in this perspective that school cartography presents itself to contribute to the construction of spatial thinking and geographic thinking of students.

From the contexts presented so far we could observe that the studies that focused on school cartography developed in line with the high daily use of maps. In geography textbooks, for their part, maps have always been present, however, it was from the insertion of the obligation to use cartographic language in the National Textbook Program (PNLD) that maps began to be used more widely. and systematic in these materials. It is worth noting that currently in Brazil a geography textbook is only approved by the Ministry of Education if it presents a proposal for cartographic communication associated with school contents.

In this sense, several researchers began to look more and more to understand how maps could be used to their full potential in the teaching of geography. One such researcher is professor Maria Elena Simielli (1986, 1999) who highlights the existence of different levels of cartographic analysis that students need to understand in order to read a map, and maps in this context should enable them to be read at different scales.

Another perspective regarding the maps present in geography textbooks refers to the level of complexity of the maps, taking into consideration the cognitive level of the students. According to Duarte (2016) maps should follow the cognitive development of students over the school years. In the case of high school, the maps in the 3rd grade textbook, the last year of Basic Education in Brazil, must be more complex than those in the 1st grade books, because the student’s cognitive development in this phase of schooling is greater. and more complex.

The textbooks analyzed in our research presented a significant amount of maps and because of this it is necessary to understand how this language is presented in the books, in order to correlate this presence with the theoretical studies in the field of school cartography. To this end, we support our discussions and analysis in Simielli (1999, p. 97) where he presents three levels of cartographic activity: 1) Localization and Analysis, 2) Correlation and 3) Synthesis. It should be emphasized that these levels will be developed from the

students 'learning process, a context that is similar to what Duarte (2016) proposes in the need for cartographic representations to accompany the students' cognitive stage.

Focusing the debate on Simielli's proposal, it is important to highlight the difference between the cognitive levels of elementary and high school students, considering that students in this final stage of schooling have greater cognitive development and, therefore, can assimilate and problematize more information in relation to elementary students.

Corroborating this idea, Duarte (2016) in his thesis presents some concerns, among them that the maps present in textbooks are only for localization and that these, too, do not correspond to the cognitive level of the students. Thus, we understand that the maps in high school Geography textbooks must correspond to the students' levels of cognitive development, and the teacher is responsible for mediating the construction of geographic knowledge from work with the syllabus of materials and curricular school.

To this end, we insert our conception into the idea of complexity, that is, that maps present themselves more complexly as students' cognitive level increases. Thus, the maps to be used for content work with third-year students may, and hopefully, be more complex than those used with first-year students in this same phase of schooling.

Complexity theory can be found from different perspectives and by different authors. In this paper we use Morin's conception (2000, p. 35-39) that articulates four elements for the construction of the pertinent knowledge, which is presented based on: the context, the global, the multidimensional and the complex. Thus, for the construction of knowledge to be meaningful, it is necessary that, linked to our research, maps and geographic contents be works from these levels of complexity expansion.

Based on these theoretical references, we present the data of this investigation, which were collected from a qualitative perspective. This method was important because it allowed us to use a more detailed and meaningful look at the obtained numbers, in order to overcome a hard and decontextualized reading of the results.

Thus, it is important to emphasize that the data must be analyzed from a context, which in this case refers to the fact that textbooks in Brazil are considered as official documents, and are therefore based on guidelines and prior verification analysis. from a group of professionals before reaching schools and being used by students. On the other hand, we are not pointing out in this paper errors that may be linked to the failure of the reviewers to evaluate them or to elaborate them, especially because our objective or purpose was not this, but to discuss the non-use to its full potential. cartographic language already existing in these textbooks.

Initially, the selection of books was based on reading the reviews available in the Guide to the National Textbook Plan (BRAZIL, 2017), a document by which the six collections to be analyzed in the research were selected.

For the choice of collections we based on three main criteria, namely: a) the collection must have been approved by the PNLD 2018 notice; b) have in the review provided by the PNLD Guide 2018 that the referred collection presents a good use / treatment of cartographic language; and c) three of these selected collections must also have been approved in the previous PNLD of 2015.

It is noteworthy that in this article we present the data referring to two collections and knowing that each collection refers to 3 books that are used throughout high school, this study worked with the analysis of 6 books.

The instrument used for the analysis of the collections was an online form (via Google Form platform) prepared by the researchers based on the objectives of this study. In this analysis instrument, besides checking the propositions of Simielli (1999) and Duarte (2016), we also list items such as: collection name, series, page number, map title, spatial cut, map size, type of Cartography (Euclidean or non-Euclidean).

Each map was analyzed independently from the books referring to the high school years, the answers were recorded by filling in the online form that automatically fed a database, generating a detailed spreadsheet of each cartographic representation, thus enabling the analysis and the elaboration of tables and graphs

The universe of this research in this text refers to the Geography textbooks of two collections of High School approved in PNLD 2018, which are entitled: a) Connections: studies of general geography and Brazil; and b) Geography: space and identity. Based on these books 367 maps were analyzed, excluding the activities, therefore, we worked only with the cartographic representations that were inserted in the body of the text, following the contents.

This high number of maps can be considered, a priori, a positive data for researchers in the field of school cartography in Brazil, since this has always been one of the concerns presented regarding the non-use of maps in classes of geography of Basic Education. However, it is necessary to be careful, because it is not enough that the cartographic language is only present in the materials, it is necessary that the maps are articulated with the proposals of the books, the teacher's mediation and the possibility of analysis, reading and construction by the student.

Thus, it was necessary to understand which cartography we are referring to, since we can list a diversity of cartographies, which can be, for example, the systematic, thematic, the sketch, the chorema, the anamorphosis, the mental map, narrative maps, among so many other possibilities. In view of this, one of the points of this analysis was concerned with the type of cartography found in the books. To this end, we divided them into two broad categories, namely: a) euclidean cartography; b) non-euclidean cartography. As a result, we find in these books an extensive cartographic representation centered on the euclidean

conception. For example, in the textbook "Connections" all maps analyzed were based on euclidean cartography, while in the other textbook "Geography: space and identity", we identified only 1.5% of the total maps in the proposal non-euclidean cartography.

In analyzing these data we recognize that it is not surprising that we find a large number of representations of euclidean cartography, which in this case refers mainly to systematic and thematic maps. This context can be explained from the standards required by the Ministry of Education to approve a textbook, as this document lists some technical criteria for the use, insertion and validation of maps in the didactic materials. Among these, it is presented that a map should contain: title, legend, scale, orientation and source.

This factor makes it difficult, therefore, the insertion of non-euclidean cartography, or as entitled Seemann (2012) the so-called subversive cartography, since this type of representation suppresses one or more cartographic elements. Thus, we emphasize that we do not advocate the use of a single cartography model over another. It is pointed out that both can and should be employed in an integrated way to work the geographic contents.

The potentialities of these cartographies are presented in different perspectives and are above all complementary, because while resorting to systematic maps to work with cartographic and geographical contents, such as contours and rainfall indices that support the analysis of certain aspects. Physical-natural aspects, on the other hand, seek in anamorphoses representations of population density and income distribution, for example, which enhance the analysis of this phenomenon to be represented on the map. Thus we understand that the metric is not always the key element for analyzing geographic space, it all depends on the teaching objective.

In addition to this context of the type of cartography present in textbooks, our map analysis was also based on the perspectives of cartographic activity levels proposed by Simielli (1999), as well as the mismatch between students' cognitive level and map complexity. present in textbooks, idea presented by Duarte (2016).

Thus, it is possible to observe that these two criteria of analysis deal with, from the perspective of Simielli (1999), if the maps present in the textbooks allow students to develop the three levels of analysis, in which the location and analysis is configured as simpler, subsequently the correlation as intermediate level and the synthesis being the highest level. While for Duarte (2016) his focus is on the analysis of how maps were used in geography textbooks for the final years of elementary school, with the perspective of using cartographic language beyond localization and valuing the development of thought. more complex of students from reading and analyzing maps. For this, this author also establishes three levels of complexity to analyze the cartographic language, which are low, medium and high.

The results obtained by this analysis revealed that the textbooks "Connections" and "Geography: space and identity" present the cartographic language strongly centered on the most elementary activity level proposed by Simielli (1999), which is localization and analysis, obtaining the following data: "Connections": 75%; "Geography: space and identity": 76%. Regarding Duarte's (2016) conception of map complexity levels, we identified that the low complexity was the most found in the cartographic language analysis present in the textbooks, having the following results for this level of complexity: "Connections" : 69%; "Geography: space and identity": 82%.

From these data we can infer that the presence of maps in high school geography textbooks offers little contribution to the development of more complex cognitions, taking as reference Morin's perspective (2000), which highlights that the four elements of pertinent knowledge will be important for the formation of complex thinking.

Based on this study we could understand that the activity levels presented by Simielli (1999), as well as the concerns exposed by Duarte (2016), were not contexts taken as reference for the production of cartographic language present in geography textbooks. It was remarkable the little concern of these materials in presenting a proposal that contemplates cartography beyond illustration and that effectively contributes to the development of learning of geographic contents.