Vol.16 | Número 38 | 2024

Submetido em: 17/07/2023 Aceito em:16/10/2023 Publicado em: 30/01/2024

Regional aproach to education in soil science for Santa Catarina

Enfoque regional da educação em solos em Santa Catarina

Enfoque regional de la educación sobre el suelo en Santa Catarina

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https://doi.org/10.28998/2175-6600.2024v16n38pe15793

Abstract: The aim of this study was to examine the teaching of Soil Science in the Base Curriculum of the Territory of Santa Catarina and to evaluate the importance of regionalized education in the curricular components of Science and Geography. For this, we used Descending Hierarchical Classification with Iramuteq 0.7 alpha 2_2020 statistical software. Both Science and Geography address issues related to the soil, and regionalized teaching has the potential to stimulate students' interest in the local environment. It is fundamental to include a regional approach in the study of Soil Science, to make teaching more meaningful and contextualized. Soil education is a powerful interdisciplinary tool that can help develop environmental awareness.

Keywords: Science. Geography. Base Curriculum of Santa Catarina's Territory.

Resumo: O objetivo deste trabalho foi analisar a educação em solos no Currículo Base do Território Catarinense, bem como, a importância do enfoque regional no ensino de solos nos componentes curriculares de Ciências e Geografia, por meio de Classificação Hierárquica Descendente e Análise Fatorial de Correspondência utilizando o software estatístico Iramuteq 0.7 alpha 2_2020. Tanto Ciências quanto Geografia apresentam temáticas sobre solos. O ensino regionalizado tem potencial para despertar interesse nos educandos acerca da realidade local. A educação em solos é uma potente ferramenta interdisciplinar no desenvolvimento da consciência ambiental.

Palavras-chave: Ciências. Geografia. Currículo Base do Território Catarinense.

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Resumen: El objetivo de este trabajo fue analizar la enseñanza de suelos en el Currículo Básico del Territorio Catarinense, así como la importancia del enfoque regional en la enseñanza de suelos en los componentes curriculares de Ciencia y Geografía, a través de Clasificación Jerárquica Descendente y Análisis Factorial de Correspondencia utilizando el software estadístico Iramuteq 0.7 alpha 2_2020. Tanto la Ciencia como la Geografía presentan temas sobre suelos. La enseñanza regionalizada tiene el potencial de despertar el interés de los alumnos por la realidad local. La educación sobre el suelo es una poderosa herramienta interdisciplinaria en el desarrollo de la conciencia ambiental.

Palabras clave: Ciencias. Geografia. Currículo Base del Territorio de Santa Catarina.

1. INTRODUCTION

Education is a form of action developed on individuals, its main objective is to train them in an integral, conscious way, allowing them to form values about the contents learned, relating them to their daily lives. (CALLEJA, 2008).

Libâneo (2001) emphasizes that education itself is linked to various processes of communication and interaction of human beings, it is through it that knowledge, techniques, skills, values, and attitudes, among others, are acquired perpetuating an organized cultural milieu. Maulin (2009) concluded that through education, it is possible to guide social, political, economic, and environmental aspects, dedicated to the autonomy and freedom of students and educators. According to Rego (2018), educating is a threefold process, as it humanizes, socializes, and makes human beings unique.

Within the social and environmental aspects, the school assumes an important role as a mediator and sensitizer of society, since it is in the school environment that students contrast, usually, common knowledge with scientific knowledge (LUSTOSA et al., 2017). With an educational intention, the school actively participates in the training of students, making them subjects capable of acting and critically understanding discussions of the school routine, experiences, and concerns of the place where they live (LUSTOSA et al., 2017).

Through the publication of the National Common Curricular Base - BNCC (BRAZIL, 2018), there was movement in the State of Santa Catarina to develop a curriculum following its assumptions and adapted to the territory of Santa Catarina.

In 2019, the Basic Curriculum of Early Childhood Education and Elementary Education of the Territory of Santa Catarina was published - CBTC (SANTA CATARINA, 2019). Based on the CBTC, it is expected that municipalities will be able to visualize their formative path, marked by the different stages of teaching and curricular components, and thus be able to use the bases of this document in the teaching and learning process, seeking in students the development of individuals autonomous and critics (SANTA CATARINA, 2019). Therefore, it is expected that students, based on the analysis of their

context, develop skills that allow them to understand social phenomena, argue ideas, and develop proposals for solving problems (MORENO-RODRÍGUEZ; DEL PINO, 2023).

The use of ecosystems for human purposes leads to their heterogeneity, resulting in intense changes in the landscape (SCHNEIDER et al., 2022). Among the ecosystems affected by anthropic action, the soil stands out, which is the result of a set of factors (climate, relief, microorganisms) that act on the surface of the rocks, a process called weathering. Weathering causes rock to slowly break down over time to form soil. Natural bodies that are subjected for long periods to the simultaneous and integrated action of the aforementioned factors, which condition them on pedogenetic characteristics, making unique the soil that forms in each environment (BRADY; WEIL, 2013). It is composed of minerals, air, water, and organic matter, with characteristics such as color, texture, structure, porosity, consistency, and cohesion, distinguishable between different types of soils (PRAKASHSAHU; SHRIVASTAVA, 2023).

Soil is a limited, non-renewable resource on the human scale of life that provides essential processes and supports the delivery of ecosystem services. These are known as 'soil functions', i.e., primary production, carbon sequestration, filtration and water regulation, habitat diversity, and nutrient cycling. All soils perform these five functions, but with different amplitudes (BAMPA et al., 2019). Therefore, it is necessary to better understand ways to conserve it and prevent its degradation due to poor agricultural practices, deforestation, pollution, and urban expansion (FISHER, 2015).

It is a valuable and fundamental natural resource for food production and for the maintenance of ecosystems. However, soil degradation is a global environmental problem that affects people's quality of life and the sustainability of agricultural and forestry systems. Understanding the processes of its formation, as well as the effects of human activities, is fundamental for making decisions that promote its conservation and environmental sustainability (URBANSKA et al., 2022).

Teachers play an important role in educating students about soil sustainability. They can teach students about the importance of soil, its ecological functions, and management practices. Teaching methods and educational tools used in schools must be adapted to the needs of students. Hands-on activities, such as laboratory experiments and field projects, can help students better understand concepts related to soil and sustainability (URBANSKA et al., 2022).

Therefore, it is important that soil concepts be included in school curricula at all levels of education. Students are expected to learn about their formation, chemical and physical properties, as well as their importance to agriculture, human health, and

biodiversity. In addition, it is essential that students learn about threats to soils and practices that can help preserve them. With proper education, individuals will be able to make informed decisions and act responsibly to preserve this vital resource (CHARZYŃSKI et al., 2022).

This work aimed to analyze the teaching of Soil Science in the Base Curriculum of the Territory of Santa Catarina, as well as the importance of the regional focus for teaching Soil Science in the curricular components of Science and Geography.

2. REVISION

The BNCC is a national document seeking to unify teaching nationwide. However, it is up to each State to build its curricula based on the proposed basis, respecting regional specificities. Brazil is a country of continental proportions, made up of different cultures, which makes it impossible to have a single curriculum that encompasses cultural diversity (SANTOS; NUNES; VIANA, 2017).

With the principle of inclusive education, the CBTC aims at citizen training with autonomy and freedom, allowing students to develop and appropriate knowledge of their culture, assuming the protagonism of this development throughout the training path (SANTA CATARINA, 2019).

It is necessary to rethink the pedagogical practice, guiding the problematization of the teaching of Soil Science, based on a research proposal that allows the student to value this knowledge in the social context in which it is inserted (BOTELHO; MARQUES; OLIVEIRA, 2019). It reflects on the soil beyond its characteristics to consider the established interrelationships (FALCONI; TOLEDO; CAZETTA, 2013).

Including topics related to soil education in the Basic Education curriculum allows for addressing problems associated with this natural resource, contributing to the population's understanding of its importance (KRZIC et al., 2014) while guiding students. In this way, the teaching and learning process must be encouraged to develop interdisciplinarily and appropriately. (SILVEIRA; MELLO, 2021). Interdisciplinarity aims to establish a connection between the different curricular components (PAULISTA et al., 2018), such as Science and Geography. These components aim to develop certain skills and competencies throughout the training course (BRAZIL, 2018).

The use of interdisciplinarity and local contextualization responds to the need for training capable of offering meaning to the knowledge that will be built by students,

integrating the construction of this knowledge into the social reality of individuals (SANTOS; NUNES; VIANA, 2017).

Soil Science education is a training process that goes beyond the transmission of scientific knowledge, allowing to broaden the understanding of environmental issues and create values about their importance for the maintenance of the Planet (OLIVEIRA, 2017). It is a formative process that requires flexibility, continuity, and participatory work (MORAIS, 2012). Encouraging students to see themselves as an integral part of nature and fostering a sense of responsibility towards fair, cooperative, and sustainable soil use is crucial for their overall development (OLIVEIRA, 2017).

An inclusive Soil Science education, mediated by the teacher, properly planned and supported by didactic materials prepared for this purpose (PERUSI; SENA, 2012), provides opportunities for environmental awareness, while the soil is a component of the natural and human environments present in the individuals' daily lives (GUIMARÃES et al., 2012).

Inappropriate use leads to environmental imbalances that reduce the quality of life of agricultural and urban ecosystems (GUIMARÃES et al., 2012; TEIXEIRA; VIEIRA, 2013). The same authors complete by emphasizing that in relation to the soil, the lack of information makes the role of education more than necessary, seeking changes in values and attitudes, expanding the perception of it through targeted work, and showing that this natural resource is present in the life of all individuals.

It is a fundamental element of the landscape, requiring pedological studies that guide sustainable and integrative awareness in society in a dynamic and systemic way (SOUSA; MATOS, 2012). Among the strategies, it is worth mentioning the introduction of this problem in the daily lives of elementary and high school students (CAVALCANTE, 2013).

In the school environment, it is more difficult for students to visualize the importance of the soil for their lives because in these cases, the soil is buried under the buildings, which prevents its visualization (SOUSA; MATOS, 2012). Therefore, the teaching and learning process needs to contain concrete experiences, allowing the construction of knowledge linked to social and cultural aspects (CAVALCANTE, 2013).

Given the above, developing work that links all the sciences with broad content makes soil education a powerful tool for human awareness, seeking to build ways to reduce environmental impacts and understand the dynamics of landscapes (FALCÃO, FALCÃO SOBRINHO, ALVES, 2011), as well as the role that the human being plays in this whole process.

3. METHODOLOGY

At CBTC, the areas of Natural Sciences and Human Sciences were analyzed, which correspond to the curricular components of Science and Geography for Elementary School Early Years (from 1st to 5th Year) and Final Years (from 6th to 9th Year).

A textual corpus corresponding to the curriculum of each Year was assembled, generating nine textual corpora for Science (from 1st to 9th Year) and nine for Geography (from 1st to 9th Year). The corpora were divided according to their teaching modality – Elementary School Early Years and Final Years. In the end, there were five corpora for Sciences, corresponding to the Early Years, and four for the Final Years. The same procedure was applied to Geography, which presented five corpora for the Early Years and four for the Final Years.

Sciences and Geography were analyzed using Descending Hierarchical Classification (DHC) according to Reinert (1986), using the statistical software Iramuteq 0.7 alpha 2_2020 (RATINAUD; MARCHAND, 2012). Initially, Iramuteq generates the total number of words and their frequency in each text. For this study, only nouns, adjectives, and verbs were used, as they provide clearer and more accurate results, this set of words is classified in the software as active forms (of interest to the researcher).

The Descending Hierarchical Classification performs an analysis that groups the textual corpus analyzed into classes (categories or clusters), in this way, the texts are successively divided depending on the occurrence and association of vocabulary, through chi-square tests (χ^2), calculating the frequency of words within each text and, subsequently, dividing by the total number of words in the analyzed corpus, generating a significance quotient through the words that present the highest frequency (SOUSA et al., 2020).

The graphical analysis allows viewing the proximity between the formed classes and the words that comprise the corpus (SOUSA, 2021). These graphs allow you to observe the connection between groupings of words. The distance that the groupings present represents how much the themes converge, that is, how much they are related (Reinert, 1983). In this type of analysis, the use of ≥ 75% of the words indicates that the corpus is suitable for the method. The percentage indicates the proportion of the total textual corpus segmented for each category.

4. RESULTS AND DISCUSSION

4.1 Nature Sciences

Table 1 presents the results generated through Iramuteq, where a corpus containing five texts was analyzed, referring to the curriculum of the 1st, 2nd, 3rd, 4th, and 5th Year of Elementary Education for the curricular component of Science. In it, it is observed that the five texts were classified into 65 segments, that is, according to the differences between the words found in them, they were divided. The total number of forms (adjectives, verbs, prepositions, adverbs, etc.) was 710, and the active forms chosen for subsequent analysis corresponded to 540 words.

These 540 words were classified into eight categories/classes and, of the 65 text segments, 60 were absorbed by this analysis, corresponding to 92.31% of the use of the textual corpus.

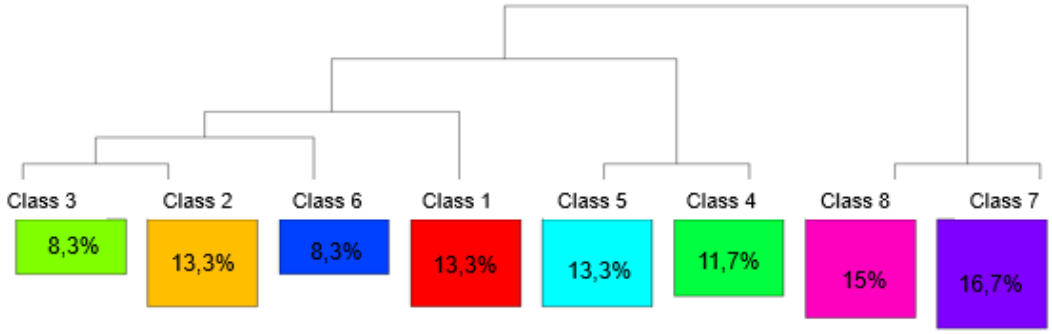
Table 1: Results using Iramuteq for the Curricular Component Science of Elementary School Early Years

Corpus classification	Quantity of *corpus* and words utilized
Number of texts	5
Total number of segments	65
Total number of forms	710
Number of active forms	540
Number of groupings	8
Classified text segments	60
Classified corpus (%)	92.31

Source: the authors, 2023.

For all results presented, read the dendrogram from right to left. In this way, the presentation will follow the right-left sequence, as shown in Figure 1. In the Science curriculum for the first to fifth years of elementary education, the corpus has been divided into nine classes (as shown in Figure 1). The two main classes, Classes 7 and 8, share similarities but also differ from each other and give rise to the other classes. Classes 2 and 3, 4 and 5 are similar to each other in terms of the textual corpus, while classes 1 and 6 differ from all the others.

Figure 1: Descending Hierarchical Classification The Science Curriculum for Elementary School Early Years.



Class Characteristics (guiding thematic axes)
7 and 8 Time, space and meteorology;
4 and 5 Use and property of materials;
1 Characteristics of animals and plants;
6 Importance and maintenance of ecosystems and biogeochemical cycles;
2 Formation of organisms, physiology and nutrition;
3 Characteristics of human beings.
Source: the authors, 2023.

Updates to the educational curriculum are necessary so that it can meet educational needs. One of the main focuses of the last update was precisely the regional approach, that is, the regionalization of knowledge worked in the classroom (SANTA CATARINA, 2019).

Regarding the results presented in Table 1, it is observed that the curriculum has six guiding thematic axes. Those that allow the inclusion of the solo theme in classes 8, 5, and 1.

In the third year of elementary school in Science, there are different segments that address topics related to soil, bringing topics such as “soil uses [..] the importance of soil for agriculture” —class 8, “types, formation, characteristics, properties, and uses of the soil.” Soil for agriculture, livestock, and mining [..] desertification, erosion, contamination, deforestation, and diseases” – class 5 and “compare different samples of soil around the school [..] color, texture, smell, particle size and permeability” —class 1.

The introduction of these concepts related to soil themes throughout the training course is a strategy that allows greater contact between the student and the object of knowledge. Making learning an accessible knowledge reconstruction experience, allows the development of a solid understanding of this natural resource and its importance for maintaining ecosystems, especially where students live.

Table 2 presents the results generated through Iramuteq for four texts, referring to the curriculum of the 6th, 7th, 8th, and 9th Year of Elementary School Final Years for the Science curricular component. It is observed that the four texts were classified into 86

segments. The total number of forms was 979, and the active forms corresponded to 721 words.

These 721 words were classified into nine categories/classes and, of the 86 text segments, 82 were absorbed by this analysis, corresponding to 95.35% of the utilization of the textual corpus.

Table 2: Results using Iramuteq for the Curricular Component Science of Elementary School Final Years

Corpus classification	Quantity of corpus and words utilized
Number of texts	4
Total number of segments	86
Total number of forms	979
Number of active forms	721
Number of groupings	9
Classified Text segments	82
Classified Corpus (%)	95.35

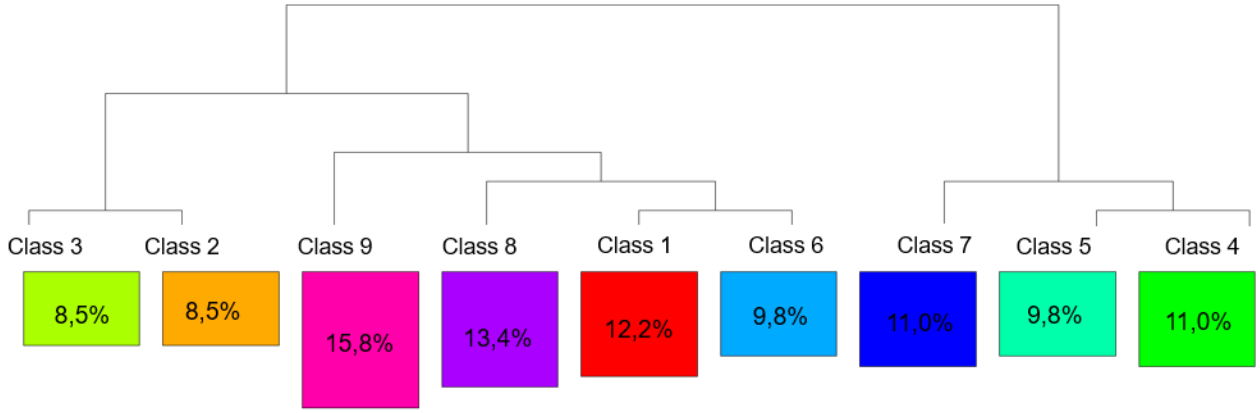
Source: the authors, 2023.

The Descending Hierarchical Classification for Science Elementary School Final Years (Figure 2) presents nine stable classes. At first, the corpus of the curriculum was divided (1st partition) into three subcorpus - classes 4, 5, and 7. In a second moment, the subcorpus of class 7 was divided into three (2nd partition), thus obtaining classes 3, 2, and 9. And in a third moment, there are more partitions, originating on one side, classes 8 on one side and 1 and 6 on the other. The division of the corpus stabilized in 9 stable classes, that is, composed of units of text segments with similar vocabulary.

As for themes related to the soil natural resource, the seventh year presented a segment: “Characterize the main Brazilian ecosystems in terms of landscape, amount of water and type of soil” in class 2, indicating what is taught on soil in this teaching modality, in the Science curriculum component.

Thus, of the nine guiding axes shown in Figure 2, classes 4, 6, 1, 2, and 3 allow teaching soils in the Science curricular component in this modality, for these are themes related to this natural resource.

Figure 2: Descending Hierarchical Classification Science Curriculum Component Elementary School Final Years



Class	Characteristics (guiding thematic axes)
4	Consumption and production of energy allied to sustainability;
5	Transformations and chemical composition of matter;
7	Equilibrium of thermodynamics;
6	Natural phenomena such as volcanoes and earthquakes;
1	Preservation of life;
8	Origin of the solar system;
9	Systems of the human body;
2	Ecosystems and impacts of global warming;
3	Rotational and translational movements of the Earth.

Source: the authors, 2023.

The area of Natural Sciences comprises the curricular component of Sciences and aims to generate opportunities, providing students with a holistic view to interpret the scientific and technological world. So, throughout their training, students have the freedom to actively engage with the knowledge they are acquiring, becoming active participants in their own social development (SANTA CATARINA, 2019).

The curriculum of Science guides the understanding of the natural environment (DAS; PAITAL, 2021), science is present everywhere, in the lives of human beings, in constant interaction with physical, chemical, and biological knowledge. It is important to converge the contents of different curricular components, starting from the student's experiences in the reality in which they are inserted, highlighting the characteristics of this environment. This teaching process suggests a collective construction between different areas of knowledge,

interdisciplinarily, aiming to promote students' complete development (SANTA CATARINA, 2019).

Field et al. (2017) state that the interdisciplinary intersection can improve learning and teaching, especially with community involvement. This approach allows students to leave the classroom to learn about industries, companies, and other organizations, which can be an effective strategy to engage, motivate and improve student performance.

Miu; Miu (2015) describe interdisciplinarity as a form of cooperation between different objects of study, which enables the student to work with systematic activities that integrate different areas of knowledge (DAS; PAITAL, 2021). Based on their context and personal experience, individuals have the possibility to build their learning through problem-solving (FIELD et al., 2017).

In numerous instances, the natural sciences tend to explore concepts using logic and mathematics. However, when linked to the human sciences, they need to frame their themes in areas such as philosophy, economics, history, psychology, sociology, and education. This forms an integrative learning process that works with the individual, society, and environmental issues, seeking to resolve social issues in the environment where individuals are inserted (DAS; PAITAL, 2021).

In school education, it is common to deal with physical-natural themes, which comprise elements unrelated to human action and are not generally addressed in the everyday conditions of the students' living spaces (SOUZA; FURRIER; LAVOR, 2021). Through the integrated and regionalized teaching and learning process, it has the potential to arouse interest in students, stimulating perception, making understanding more accessible, and consolidating conscious attitudes (MARQUES; BARRETO; MARQUES, 2021).

Working interdisciplinary themes through innovative practices in the school space is of paramount importance, as it enables the realization of learning, citizen training, and awareness of environmental practices that aim to conserve and preserve natural resources. (LUSTOSA et al., 2017).

The study of natural resources soil is a fundamental theme during the formative course due to human actions on the environment, generating changes in ecosystems. These changes tend to intensify as the number of inhabitants on the planet grows, leading to the need to understand ways of using and occupying environments sustainably. (SOUZA; FURRIER; LAVOR, 2021).

By approaching the soil theme in an integrated and contextualized way, students can understand society's different conceptions about the soil and how these conceptions affect the practices of land use and occupation. Furthermore, gaining a deeper comprehension of the significance of soil in their daily lives and the environment at large is essential. In this way, environmental education can be a powerful tool to make students aware of the importance of the soil and encourage the adoption of more sustainable land use and occupation practices. This contributes to the preservation of the environment and

the well-being of communities that depend on the soil for their subsistence. (SOUZA, 2022).

4.2 Human Sciences

Table 3 presents five texts, referring to the curriculum of the 1st, 2nd, 3rd, 4th, and 5th Year of Elementary Education for the curricular component of Geography. It is observed that the five texts were classified into 79 segments. The total number of forms was 690, and the active forms corresponded to 502 words.

These 502 words were classified into 10 categories/classes and the 79 text segments were absorbed by this analysis, corresponding to 100.00% utilization of the textual corpus.

Table 3: Results using Iramuteq for the Curricular Component Geography Elementary School Early Years

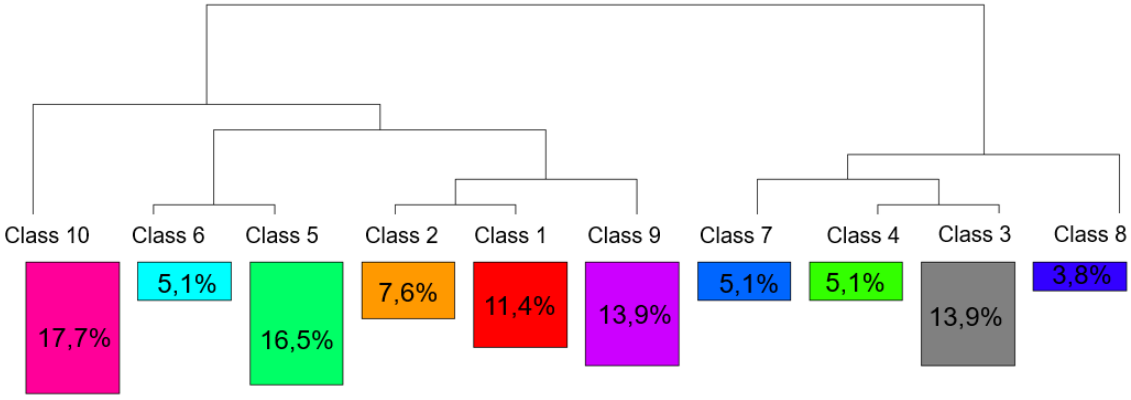
Corpus classification	Quantity of corpus and words utilized
Number of texts	5
Total number of segments	79
Total number of forms	690
Number of active forms	502
Number of groupings	10
Classified Text segments	79
Classified corpus (%)	100.00

Source: the authors, 2023.

The *corpus* of the curricular component of Geography for Elementary School Early Years (Figure 3) was segmented into ten stable classes. Initially, the corpus was divided into two main classes – classes 8 and 10. In the sequence (2nd partition), class 8 was subdivided, originating class 7, which underwent a new segmentation and formed classes 3 and 4. Class 10 also underwent segmentation and generated classes 9, 5, and 6. However, class 9 underwent new segmentation, originating classes 1 and 2. With this, it is observed that classes 8 and 10 differ from all other classes in terms of the themes they represent.

As for the soil theme, in the second-year curriculum, it is observable sentences that refer to this natural resource: “[..] use of natural soil and water resources in the countryside and in the city” – class 2, “recognize the importance of soil and water for life [..]” – class 8.

Figure 1: Descending Hierarchical Classification Curricular Component of Geography Elementary School Early Years



Class	Characteristics (guiding thematic axes)
8	Indigenous issues and migratory processes in Brazil;
3	Political fields in the country;
4	Racial flow, borders, culture, and social groups;
7	Municipalities, territoriy, and location;
9	Daily activities that impact natural resources;
1	Quality of areas occupied by human beings;
2	Production, problems caused by rain and food quality;
5	Similarities, differences, space, and place of experience;
6	Transport and means of communication;
10	Spatial representation, cartography.

Source: the authors, 2023.

Out of the 10 thematic axes found in this curriculum, the theme of the solo can be worked on in all of them. If the area of Natural Sciences, presented above, allows an in-depth study of the chemical, physical, and biological relationships that occur in the environment, the area of Human Sciences focuses, especially, on the relationships that human beings establish with this natural resource.

In this way, both areas complement each other, allowing a holistic and contextualized understanding of the topic. Working together in both areas allows students to understand not only the scientific and environmental aspects that involve soil, but also how human action impacts this natural resource and how this affects society in general.

Table 4 presents four texts, referring to the curriculum of the 6th, 7th, 8th, and 9th Year of Elementary School Final Years for the curricular component of Geography. It is observed that the four texts were classified into 119 segments. The total number of forms was 908, and the active forms corresponded to 634 words

These 634 words were classified into 10 categories/classes and the 119 text segments were absorbed by this analysis, corresponding to 100.00% use of the textual corpus.

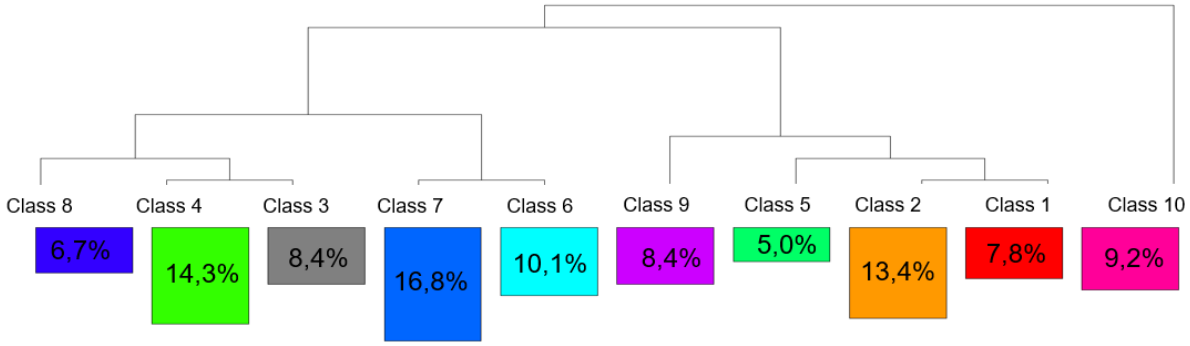
Table 4: Results using Iramuteq Curricular Component of Geography Elementary School Final Years

Corpus classification	Quantity of corpus and words utilized
Number of texts	4
Total number of segments	119
Total number of forms	908
Number of active forms	634
Number of goupings	10
Classified text segments	119
Classified corpus (%)	100.00

Source: the authors, 2023.

The textual corpus was segmented into ten stable classes for the curricular component of Geography Elementary School Final Years (Figure 4). The first class to be formed was 10, which was partitioned into classes 9 and 8. In a third moment, class 9 was partitioned into class 5, which then created classes 1 and 2. Regarding class 8, in a third moment, it was partitioned into classes 4, 3, 7, and 6.

Figure 2: Descending Hierarchical Classification Curricular Component of Geography Elementary School Final Years



Class Characteristics (guiding thematic axes)
10 Cartography;
1 Raw material for energy generation;
2 Characteristics of Latin American countries;
5 Asia, Europe, and Oceania;
9 Advantages and disadvantages in the use of goods;
6 Territorial history of Asia, Europe, and Oceania;
7 Lands of traditional communities in Santa Catarina;
3 Connections and scales, national and international corporations and organizations;
4 Post-War in Latin America and Africa;
8 Subject and place of experience.
Source: the authors, 2023.

As already discussed previously, the thematic axes presented for this teaching modality, all allow the teaching of soils to be worked on. Focusing on the relationships that human beings establish with this natural resource, as well as the impacts arising from this relationship.

Regarding the theme of soils, in the sixth year, he observed segments related to: “types of soil, relief, and plant formations” – class 8, “forms of soil use, land rotation, terracing, embankments [..] use of the natural elements soil and water in agriculture,

relationship with the climate, organic production, use of pesticides and their impacts [..] mineral and energy resources, production and human consumption" – class 9, "uses and occupation of soils in Africa and America" – class 10.

The area of Human Sciences comprises the curricular components of History and Geography; here, only the last one will be presented. Geography was organized based on theoretical and methodological meanings, which have as guides to scientific knowledge: Place, landscape, region, geographic space, territory, networks, society, and nature. This knowledge conceives to the individual, the space he occupies in the environment, scales and connections, his work, how he presents himself, the way he thinks in relation to space, the environment, and, finally, quality of life (SANTA CATARINA, 2019).

Geography is concerned with the relationships that human beings establish with nature, based on the systematization of nature and society in themes that allow students to understand the world, offering fundamental knowledge for their development, as well as the relationships performed daily (FALCÃO, FALCÃO SOBRINHO, ALVES, 2011).

Food production is just one of the ecosystem services that the soil provides to sustain life. In this sense, Geography allows knowing the organization of geographic space, as well as how the environment works and the established relationships so that it understands the role of society in the process of construction and production of the territory (BOTELHO; MARQUES; OLIVEIRA, 2019).

Within the teaching of Geography, efforts to improve education in soils must be relevant to the needs of the local context, that is, physical, environmental, economic, and cultural aspects, adopting problem-based learning strategies that facilitate the involvement of students and the community, which provide experiences and allow engagement in the construction of multidisciplinary knowledge (FIELD et al., 2017)

Thinking about the natural resource soil refers to its importance as a reservoir of life, a component of ecosystems, which suffers from human action losing its quality, which in turn compromises all living beings (LUSTOSA et al., 2017). There are several actions that humans take that negatively impact the soil, including contamination, pollution, and related activities such as burning, deforestation, and improper garbage disposal. It is crucial to act and increase awareness about the importance of soil conservation. Schools have the opportunity to play a significant role in promoting this awareness and educating students to become agents of positive change in society. Citizenship training is fundamental to building a sustainable future (LUSTOSA et al., 2017).

Almeida et al. (2020), in their studies, found that students have knowledge related mainly to the use of soil for planting, without any understanding of its formation,

composition, or any other characteristic, concluding that, when studying soil, their understanding needs to be dynamic and not related to isolated facts.

The teacher, therefore, is the guiding agent of the procedures that lead students to act in the face of the world's complexity, locate, decode, understand the signs, and develop criticality, as well as the ability to problematize facts. Therefore, the understanding and perception of space is an essential part of the knowledge built by the student, arising from the efforts of teachers (BOTELHO; MARQUES; OLIVEIRA, 2019).

The soil thematics must be adjusted to the available curriculum and the reality of the school space in each place. Through the construction and reconstruction of signs, there is the possibility of developing environmental awareness, while cognitive development occurs through the interaction between the student, environment, object of knowledge, and people. (ARRUDA et al., 2021). To this end, the teacher needs to approach the social context of their students, being an essential condition to achieve the contextualization of the act of educating (MORENO-RODRÍGUEZ; DEL PINO, 2023). According to the authors, contextualization is a tool that helps individuals cultivate critical thinking skills necessary for taking informed actions as responsible citizens.

Brevik et al. (2022) conclude that educating about soils requires a holistic approach, in particular, to its role in the lives of individuals, increasing the understanding of their importance to the natural and urban environment. There is still much work to be done to attain the desired level of knowledge connectivity, which is reflected in the creation of safe, healthy, and functional soils for future generations.

5. CONCLUSION

The analysis of soil education in the Base Curriculum of Território Catarinense reveals a concern about including content related to soil in the curricular components of Science and Geography. However, it is important to highlight that the regional focus is essential for more meaningful and contextualized teaching.

In the curricular component of Science, the basic curriculum foresees the study of soils from the sixth year of Elementary School, with approaches related to soil formation, physical and chemical characteristics, and importance for the environment and agricultural production. In the curricular component of Geography, the approach to soils is broader, involving aspects related to the distribution of soils in the territory of Santa Catarina, its relationship with the climate, relief and vegetation, in addition to its economic and social importance.

For a more meaningful and contextualized teaching, it is necessary to include regional particularities in the study of soils, considering the differences in climate, relief, vegetation, and agricultural production between the different regions of the state of Santa Catarina. In this way, students will better understand the relationship between soils and human activities in their region and develop critical and reflective thinking about environmental and social issues related to the use of soil.

Soil education in the Base Curriculum of the Territory of Santa Catarina is relevant for forming citizens aware of the importance of soil for life and food production. Being a powerful interdisciplinary tool that can help develop individuals' environmental awareness throughout the formative path of Basic Education.

6. ACKNOWLEDGEMENTS

We are grateful for the financial support to the Research Support Program PAP UDESC-FAPESC 2021 TR896 and PROAP-CAPES, CAPES for providing the research grant, KlabinS.A. for financing the project and Professor Dr. Luiz Paulo Raber for reviewing the article.

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