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PRACTICES RELATED TO PHYSICAL-NATURAL THEMES IN GEOGRAPHIC EDUCATION USING VIRTUAL GLOBES

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ABSTRACT
The article addresses Information and Communication Technologies as a resource for mediating the learning process in pandemic times. The objective is to present Google company tools (Earth Pro, Maps, MyMaps) and their potential for teaching geography regarding physical-natural themes. The work commences with an analysis of the document named "Base Nacional Comum Curricular para o Ensino Fundamental", focusing on the organic and progressive set of essential learning that geography must develop throughout Basic Education. It is followed by some references in the matter of geotechnologies contributions to the learning process. Subsequently, it presents some propositions created and tested using geotechnologies as a stimulus to spatial thinking applied to some units that cover and structure the school of Geography: World and work (Transformation of natural and anthropic landscapes); Forms of representation and spatial thinking; Nature, environments and quality of life. It is concluded that in the period of adaptation of the learning process experienced during the COVID-19 Pandemic, these tools were a strategic resource in the training process of geography teachers.
.**Keywords:** BNCC; Geotechnology; human/environment interaction, Geography.

PRÁTICAS RELATIVAS ÀS TEMÁTICAS FÍSICO-NATURAIS NA EDUCAÇÃO GEOGRÁFICA USANDO GLOBOS VIRTUAIS

RESUMO
O artigo aborda as Tecnologias de Informação e Comunicação como recurso para mediação do processo de aprendizagem em tempos de pandemia. O objetivo é apresentar as ferramentas da empresa Google (*Earth Pro, Maps, MyMaps*) o e suas potencialidades para o ensino das temáticas físico-naturais em Geografia. O trabalho inicia com uma análise documental da Base Nacional Comum Curricular para o Ensino Fundamental, com foco no conjunto orgânico e progressivo de aprendizagens essenciais que a geografia deve desenvolver ao longo da Educação Básica. Em seguida, traz algumas referências nacionais no uso dessas geotecnologias para o processo de aprendizagem. Na sequência, apresenta proposições, criadas e testadas em aula, usando as geotecnologias como estímulo ao pensamento espacial para algumas unidades que abrangem e estruturam a Geografia escolar, que são: Mundo e trabalho (Transformação das paisagens naturais e antrópicas); Formas de representação e pensamento espacial; Natureza, ambientes e qualidade de vida. Conclui-se que no período de adaptação do processo de aprendizagem vivido

durante a Pandemia de COVID-19, estas ferramentas foram um recurso estratégico no processo formativo de professores de geografia.
Palvras-Chave: BNCC; Geotecnologias; interação homem x meio; Geografia; Pandemia.

INTRODUCTION

We currently live in a society highly inserted in the digital environment and in the use of technologies. This process occurs from the third industrial revolution, also called techno-scientific. Access to digital media and technological devices has expanded in the school environment, which was more evident during the COVID-19 pandemic, contributing to student learning and the mediation of knowledge by the teacher. In this way, teacher training courses, as well as the bodies responsible for the area of education and education policies are increasingly committed to inserting the use of technologies in the school environment and in the learning process.

The most recent document that guides teaching and learning, the National Common Curricular Base (BNCC), approved in December 2017 for Elementary School, contemplates the development of skills and abilities related to the critical and responsible use of Information and Communication Technologies (TDIC's) in all areas of knowledge and highlighted in various skills and abilities with varied learning objects (BNCC, 2018).

In the context of Geography Teaching, different TDIC's contribute to communication and to relationships and to learning, however, Geotechnologies gain highlighted space, which can be understood as the set of technologies for collecting, processing, analyzing and making available georeferenced information, or that is, information linked to a particular geographic location system.

In this article, we analyze the BNCC, related to the final years of Elementary School, to identify what type of geotechnological activity, such as Google Earth, can contribute to exercising spatial thinking.

MATERIAL AND METHOD

This work was carried out from bibliographical and documentary research, as well as from the classes of the discipline of Geotechnologies applied to Geography of the Degree in Geography at the Federal University of Pelotas.

Bibliographic research can be explained as "[...] that which is carried out from the available record, resulting from previous research, in printed documents such as books, articles, theses, etc." (SEVERINO, 2007). The documentary research aims to know the legal documents on the subject, such as the BNCC. In the 'Geotechnologies applied to Geography' classes, we learned to use some resources linked to Google Earth and Google My Maps already proposed by Genevois (2007), Antunes (2013) and Meneguette (2014), which contribute to the proposition of practices for the teaching of geography in agreement with the BNCC.

In this way, with this methodology it will be possible to understand the meaning of technology and digital technology in teaching and learning according to the BNCC, as well as to build proposals about geotechnologies for the final years of Elementary School that involve the understanding of the location and the distribution of facts and phenomena

on the terrestrial surface, territorial planning, existing connections between physical-natural components and anthropic actions.

RESULTS AND DISCUSSION

According to the BNCC, the teaching of Geography aims at the world we live in, with its ideals, in order to give meaning to social groups, understand natural and geopolitical areas arranged around the globe. Its advancement with the school years brings with it a stimulus for spatial thinking, thus attributing rational thinking, and the insertion of multidisciplinary knowledge, but with a focus on the geographical context. This thinking carries with it criteria of analogy, connection, differentiation, distribution, location and order, in this way, the skills worked are focused on problem solving. In this context, the problem talks to geographical questions, such as "where is this fact located?", ``why is it located? If a new methodology to approach the theme and conversation with new languages, thus permeating the five units that understand and structure Geography within school teaching, they are: The subject and his place in the world; Connections and scales; World and work; Forms representation and spatial thinking; Nature, environments and quality of life. These are worked within their specific skill contexts (BNCC, 2018).

Also according to the BNCC (2018), incorporating TDICs in pedagogical practices and in the curriculum as a learning object requires special attention and can no longer be a neglected factor by schools. It is necessary to rethink pedagogical projects with a view to using technologies and digital resources both as a means, that is, as support and support for the implementation of active methodologies and the promotion of meaningful learning, and as an end, promoting the democratization of access and including students in the digital world. For this, it is fundamentally necessary to revisit the pedagogical proposal of the school and invest in the continuing education of teachers.

During remote teaching, it was necessary to think of new activities, which could be carried out in this modality, but which can be developed throughout the entire academic journey. The BNCC proposes several common thematic units that should be developed throughout elementary school. One of them relates more specifically to the use of geotechnologies, which is the Forms of Representation and Spatial Thought, however, the other units often give rise to the use of geotechnologies; they are: The subject and its place in the world, Connections and scales, World of work, Nature, environments and quality of life.

According to Pimentel (2022), the technologies of the 21st century have something peculiar to everything that has happened in the history of humanity and its technology. If technology used to produce technical improvements in our lives or productive facilities, in the 21st century we are not just sharing a job with machines, we are inhabiting the machines. They are no longer just the fixed ones in our landscape, as Milton Santos wrote, now we enter their landscape, they captured us and virtualized our life, work, consumption and relationships.

Considering these new conditions, it is necessary to think and test the development of spatial or cartographic representation skills, thus structuring literacy in the same. Cartography as a language is a component of the curricular base of geography, but not exclusive to this area of knowledge. Learning this language aims at the integral formation of the student, not only in terms of decoding maps, but also in understanding the types of

choices of those who are mapping and the empirical relationships of its author, as well as their culture, experiences and, mainly, with the function that the map will express.

There are several tools that can be used when working on the specific thematic unit linked to cartography and related ones, among them the virtual globes of the Google company (Earth Pro, Maps and MyMaps). Initially intended for the general public, the "virtual lands on the Internet" to which these tools provide access are an invitation to travel. Even so, the editing tools for the free versions are often reduced and are essentially limited to placing landmarks (markers), which is reminiscent of the days when pins were still stuck in maps.

Google Earth Pro presents, in a visual geospatial context, a large amount of information that applies to topics that are covered in geography teaching. Through the program that allows the exploration of the terrestrial globe in a three-dimensional model, there are several possibilities: Street View, which is the way to "enter a map", through the function you have a 365º view starting from the ground, being possible to move within the site; Layers, which overlay allow the visualization of thematic contents; three-dimensional representation of the terrain, among others. By offering the ability to put this information in combination

Figure 1- Comparison of images from the same area on different dates.

Source: Google Earth Pro, 2021. Organized by the authors.

These images provide an understanding of "fishbone" deforestation, which consists of the opening of roads that form mosaics of devastated areas interspersed with small forest fragments. Likewise, students will already be working on notions of legend, scale, title and north in the representation.

Another way to develop, more specifically, the unit "Forms of Representation and Spatial Thought" is by customizing the aspects observed in Google Earth in Google My Maps, which allows sharing the maps created. For the execution of the activity, the students choose scripts that are part of the content worked. For example, when dealing with topics related to relief and climate, the student remembers paths he has already taken in his life, marked by the difference in relief. Google My Maps allows users to do some customization of symbols and share these custom maps from the Google Maps base. It is also possible to add points, lines and routes created in Google Earth or other programs on this platform, in addition to inserting layers by customizing the items of each layer with their own MyMaps functionality styles (figure 2).

In the map prepared by the authors, entitled “Entrando nas Nuvens”, a route was drawn between points that generated an affective and climatological memory, among them are the starting point and the arrival point, in addition to the main one between the route, which would be the “entrance” in the clouds, there are still markings with images of the Atlantic Forest, the Paraibuna dam and over the Jundú, a vegetation that is at risk of extinction composed of grasses and shrubs. All points on the map refer to memories and moments previously lived in the place.

From the path traced between São Paulo and Ubatuba in Google Earth Pro, it was possible to obtain the elevation profile of this route and insert different types of landscapes in the route. When taken to an image editor, it is possible to better represent the moment that the vehicle arrives at the Serra do Mar escarpment (Figure 2), where, due to the orographic effect, the phenomenon of fog and rain very often occurs.

Figure 2- Elevation profile created in Google Earth

Source: Google Earth Pro, 2021. Organized by the authors.

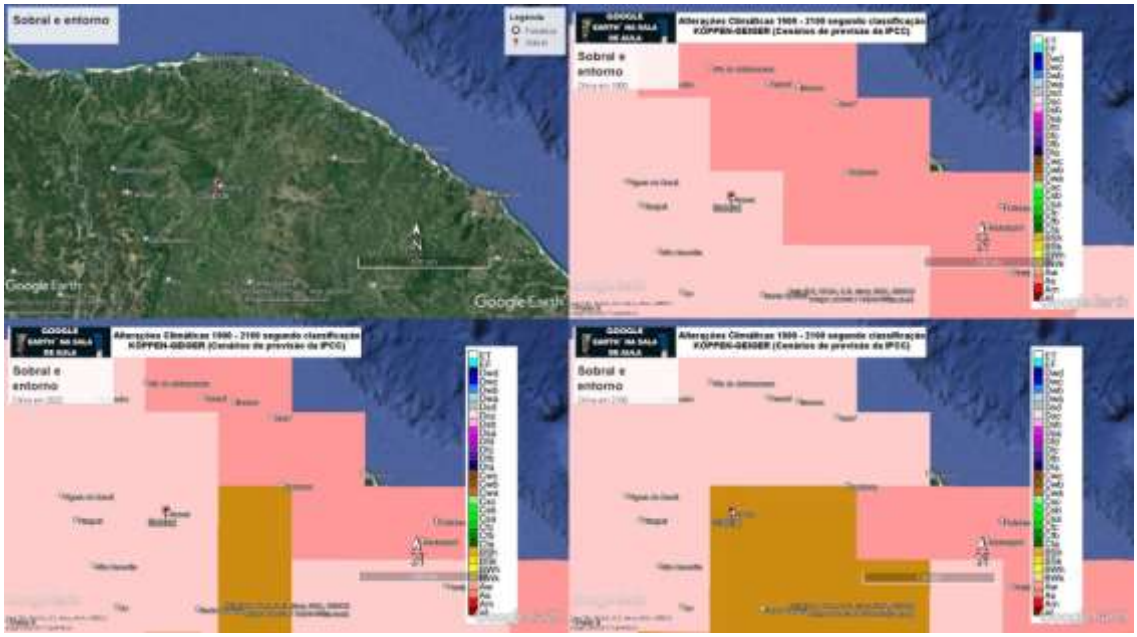
Original pedagogical approaches can be created, for example: using markers for a virtual visit to a city designed as an urban itinerary based on photographs, or even the study of a territory, based on a literary text. To get out of imposed routes, teachers can also give students the opportunity to build their own itinerary.

An interesting tool to present concerns about the future, which is part of the Unit “Nature, environments and quality of life”, was the one that Antunes (2013) made available on the changes in climate types across the globe. Data since 1900, when Köppen proposed its climate classification, to the present day result from temperature and precipitation records from all over the globe, while world maps for the period 2003–2100 are based on projections of sets of global climate models provided by the Tyndall Center for Climate Change Research. The main results comprise an estimate of changes in climate typologies in the 21st century, considering different scenarios from the Intergovernmental Panel on Climate Change (IPCC) and the Special Report on Emission Scenarios (SRES).

In the book "Google Earth in the Classroom", Antunes (2013) launches the KML animated map "Climate Change between 1900-2100 (KÖPPEN-GEIGER classification)". With the weather navigation tool, you can get the animation every 25 years between 1900 and 2100 and get a weather forecast in the near future. When selecting

each of the classification areas that occupy the earth's surface, in the different years, you can also consult the typology according to the classification. An example is in figure 3.

Figure 3 - Climate Change in Sobral and surroundings, between 1900-2100 (KÖPPEN-GEIGER classification)



Source: Prepared by the authors based on Antunes (2013).

The mosaic of 4 maps, presents, firstly, the view of Sobral-CE and surroundings from the satellites; in the following, the regional climate in 1900 is presented, when Köppen defined its classification; the next map presents the distribution of typologies in 2022 and, the last one, the forecast of the distribution of typologies in 2100. In all maps, referring to climate typology, the savanna climate predominates, in which the driest month has rainfall below 60 mm and is equivalent to less than 4% of the total annual precipitation, sometimes presenting a drier season in winter (Aw) or in summer (As). Note, however, that, as of 2022, the BSh type – hot semi-arid climate begins to appear near Sobral. This climate which is characterized by scarcity and great irregularity in its distribution of precipitation; low cloudiness; strong heat stroke; high evaporation rates, and high average temperatures (around 27ºC) will, in 2100, become the climatic type of Sobral and surroundings.

CONCLUSIONS

In this article we share some reflections carried out during the course of "Geotechnologies" in the UFPEL Licentiate course. In addition, the urgency of making the student write at all stages of the activity is considered: writing to communicate, writing to reflect, research, writing to understand, writing to learn.

We also realize that, in a globalized society, the less "connected" people are, the more excluded they are from this society, which reinforces the importance of TDIC's work in schools. Due to the pandemic situation, students and teachers were forced to a rapid and unexpected technologization, with that the number of students who dropped out of schools was very large, either due to lack of resources for access, or lack of incentive and

structure. This shows the importance of free access to technologies so that this exclusion does not occur.

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