



**Environmental Education and Climate Change in basic education:
conceptions and practices**

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ABSTRACT

This paper aimed to identify the climate change conceptions of a group of students from basic education in order to, based on this data, develop actions of Environmental Education. The didactic sequence was conducted during the Science lessons for a 6th grade class of Elementary School, from a private school in Maringá (PR). To identify the previous conceptions about the environment and climate change, a diagnostic assessment was done, in which the students were able to express through texts and drawings their understandings on the topics in question. At this stage, the content analysis technique was used to interpret the answers. Next, during theoretical and practical lessons, were discussed the conceptions raised, the main concepts and processes linked to climate change, as well as the possible sustainable practices the school can embrace. The result of the study highlighted that the students had a simplistic view on the environment, since 82% of them associated the term, essentially, to nature and not one child considered the human being as a part of the environment. In addition, most of the students confused the concepts of “weather” and “climate”, as 67% of them stated, mistakenly, that the effects of climate change are temperature changes in a short period of time. In the end, it is possible to say that the discussions and practices in class promoted a redimensioning of the students’ views on climate change, expanding their knowledge and raising their awareness about local and global socioenvironmental challenges.

KEYWORDS: Environmental conceptions. Climate emergency. Environmental Education.

1. INTRODUCTION

The discussions about “*climate change*”, currently, have great emphasis in society, because countless information on this topic is released by mass media. However, many of these discourses, elaborated by part of the media around this subject, contain conceptual errors and are presented in a distorted and sensationalist manner, highlighting a deterministic view regarding the phenomenon.

Therefore, it is essential that the topic of *climate change* be worked on in schools, emphasizing controversy and the inherent complexity of the process (REIS; SILVA; FIGUEIREDO, 2015). In the context of basic education, considering the National Common Curricular Base – BNCC (BRAZIL, 2018), the subject falls under Contemporary Transversal Themes (TCT), specifically the *environment*, besides belonging to the content organized by grade in science, in other words, being an object of knowledge in practically all the initial and final years.

Jacobi (2014) states that the topic *climate change* is already capable of exceeding the dimensions of an environmental problem, an expression which often minimizes it. For the author, the scientific community says that “humanity became the main force for the planet’s geological change and the planet’s ability to continue assimilating and mitigating the impacts coming from human pressure is giving visible signs of depletion” (JACOBI, 2014, p. 59, own translation).

In this sense, schools become essential spaces for, in addition to elaborating concepts and thoughts, enabling fertile conversations, giving children and young people the awareness of and commitment to the climate emergency. From this perspective, the Environmental Education provides subsidies, knowledge and practices in order to add to the adjustment and mitigation of the impacts caused by climate change.

Liotti and Campos (2021) recognize Environmental Education as an important and necessary tool that can play a role in tackling climate change, promoting citizenship

development, since it initiates discussions, debates, dialogs and reflections about the impacts generated by it.

According to Jacobi *et al.* (2011, p. 145, own translation), it is necessary to have

[...] a theoretical and methodological instrumentalisation of the educator in the process of initial and continuous training, in different training areas, to develop the learner’s potential regarding the knowledge about climate change and the attitudes and values involved in this process, from early childhood education to higher education.

Liotti and Campos (2021) put an emphasis on the school’s role as a space for reflection facing environmental issues, strengthening the role of Environmental Education as mediator and builder of environmental educational practices that aim at the criticality and emancipation of the subjects, before the problems presented and lived in their everyday lives.

Along the same lines, Lima and Layrargues (2012) reinforce, still, that the development of an environmental awareness on the subjects is closely related to their scientific training, inherently qualified and articulated with theory and practice, seeking to promote a theoretical understanding of the problem, breaking with the passivism and enhancing the critical environmental citizenship.

Thus, this work aimed to investigate the previous conceptions, of a class of students from basic education, about “environment” and “climate change”, in order to orientate a didactic sequence, or rather, a set of theoretical and practical classes on the topic of “Environment and Climate Change”, within the fundamentals of Environmental Education, in order to create a favorable place for reflections and dialogues about the ongoing climate emergency, striving for the critical training of the participants.

2. METHODOLOGY

The research done had a descriptive-qualitative approach. The subjects were eighteen students from the 6th grade of a private school in the Municipality of Maringá (PR), of approximately 11 years old.

One of the authors teaches the class, in addition to being a collaborative professor of the education area in the course of Biological Sciences and the others are post-graduates and professor of the Graduate Program in Education for Science and Mathematics from the State University of Maringá (UEM).

The didactic sequence was organized in four meetings (with two classes in each meeting), approaching the topic “Environment and Climate Change”.

The data collection tools utilized in the research were activities of text and drawing production and analysis of the production of the *EduClima* panel, which was made available at a promising place at the school.

The goal of the initial activity was to identify the students' previous conceptions about “environment” and “climate change”, by means of the elaborated text and the drawings. Thus, it was solicited that they write and illustrate on a sheet of paper what they understood by “environment” and “climate change”. Later on, the drawings were set on the board, analyzed and debated by the professor and the researchers. The technique of content analysis was used to interpret the drawings and text. Next, during the theoretical and practical lessons, were problematized the conceptions raised, the main concepts and processes linked to climate change, as well as the sustainable practices that had the possibility of being adopted at the school.

It is worth noting, that in the case of the conceptions of environment, in this work, the authors followed the fundamentals of Reigota (2007), which puts the conceptions in three groups: a) Naturalistic - considers the environment along with nature, prioritizing its natural aspects, such as fauna, flora and physical-chemical aspects; b) Anthropocentric - comes from a view that the environment is a source of resources to be used and managed by the human being; c) Globalizing - Already identifies humans along with the other elements of the environment, in a perspective of including and considering the cultural, economical, philosophical, natural and political aspects.

In the last meetings, the students took stories (searched on the internet, magazines, news, social media, etc.) that touched on the topic “Environment and Climate Change” (global warming, greenhouse effect, pollution, environmental disasters, etc.) for the discussion and production of the *EduClima* news, whose goal was to bring important and updated information on the latest years' events that impact our planet.

Lastly, *papa-pilhas* (battery disposal baskets) were constructed, by using recyclable materials, with creativity and playfulness in mind, as a means for the disposal of batteries. The items made were displayed in prominent places at the school, along with an orientation poster. After the collection of a good amount of batteries, they were taken by a company responsible for the correct disposal in the city, reinforcing the social importance of selective collection.

3. RESULTS

3.1 Conceptions about environment and climate change

First, as explained, it was asked that the students write and illustrate their ideas on the environment. There are numerous authors that seek to identify the conceptions or representations of the environment, by students, since knowing them is essential in order to understand and orientate the didactic-pedagogical strategies to be adopted by educators, with the perspective of expanding the environmental view and perception of the students.

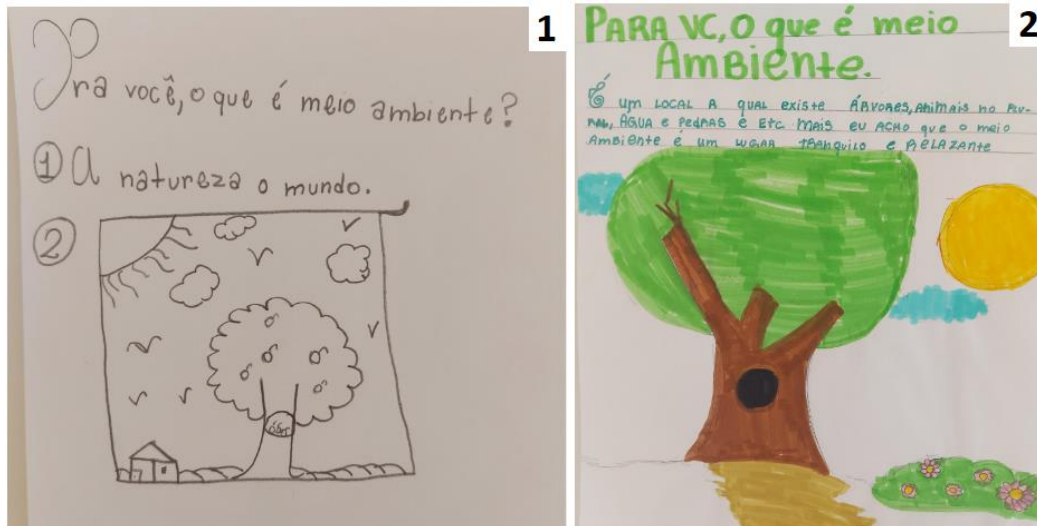
This activity's analysis, showed that the students have a simplistic view about the environment, being that 82% associate the term, essentially, to nature (naturalistic and conservative view) and no child considered the human being as part of the environment. This is notable in some of the students' lines, such as:

[...] the environment is the nature, the world.

[...] environment is a place where there are trees, animals.

This same naturalistic conception of the environment has been present in the students’ illustrations and graphic representations, as shown in Figures 1 and 2.

Figure 1 and 2. Initial activities about “environment”.



Source: The authors.

To Molin, Pasquali and Valduga (2007), elementary school students present conceptions of the environment that are shown as a natural place, composed of elements of nature, such as water, land and plants.

Martinho and Talamoni (2007) indicated that most 4th grade students, studied in research, demonstrated definitions of environment associated with a naturalistic view of the environment, as in the statement presented: “the environment is the forest with the things that are there, right”. Although, there have also turned up anthropocentric representations (approximately 25%), like in the following example: “it is nourishment for our life, the air we breathe to live” (p. 05, own translation).

In a second moment of the present intervention, it was requested that the students write and illustrate their ideas around the topic “climate change”. From there, it was possible to determine that there is confusion and an incorrect (or inconsistent) understanding about the concepts of “weather” and “climate”. Most students (67%) said, mistakenly, that changes in climate are changes in weather in a short period of time.

[...] to me it's when at 4h it's really hot and at 5h it's really cold.

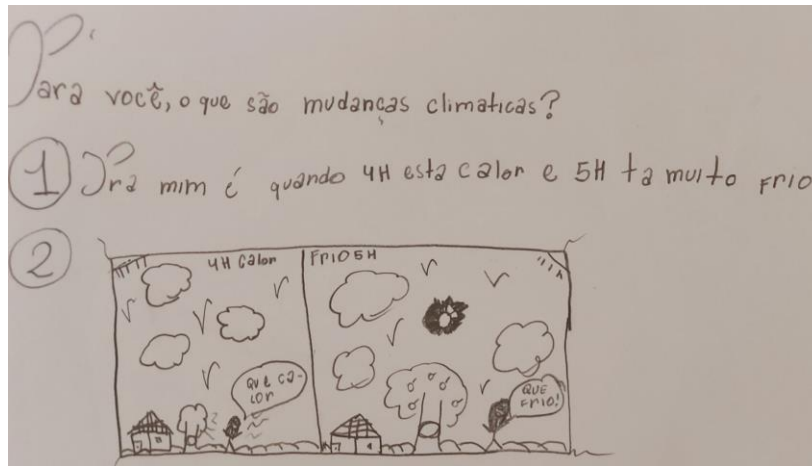
[...] i think it's when the temperature rises rapidly.

[...] the climate suddenly changes.

[...] the climate is when it's cold in the morning and in the afternoon it's hot.

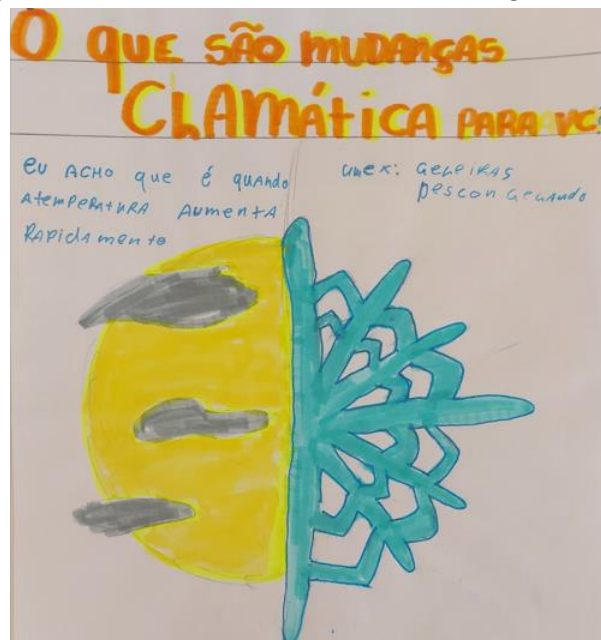
In order to exemplify some of these answers through graphic representations, figures 3 and 4 present some of these conceptions.

Figure 3. Initial activities about “climate change”.



Source: the Authors.

Figure 4. Initial activities about “climate change”.



Source: The authors.

Libanore and Obara (2009), in a study with 8th grade students from elementary school and two teachers of the subjects of Science and Geography from a private school in a municipality Northwest of the State of Paraná - Brazil, had already identified, at the time, a conceptual confusion on their part in relation to the phenomenon of the greenhouse effect, global warming and destruction of the ozone layer.

Azevedo (2013) identified, in his doctoral research, that the teachers in continuous training from Amazonas, demonstrated that their representations about global warming and gas form an abstract picture, which is found in the words *heat* and *glaciers*, so that, then, this group is able to have a coherent thought with such representation.

Ferreira, Musis and Nogueira (2016) also demonstrated that students of the course of civil engineering have wrong conceptions regarding what is global warming and its consequences. The authors affirm that there is, in this investigated group, the use of terms related to immediate changes and exemplification through punctual phenomena, which demonstrate a “reductionist view of the atmosphere biosphere interaction, in which there is more of an alarmism, because of its psychological power, would carry the resemblance of the truth” (p. 80, own translation).

After the preparation of these graphic representations, there was, in the third meeting, a dialog and discussion involving the whole class, in a way that the students were able to express, share and discuss their conceptions on the theme. At this moment, it was possible to exemplify related phenomena, short and long term damages, anthropic interference and other relevant points.

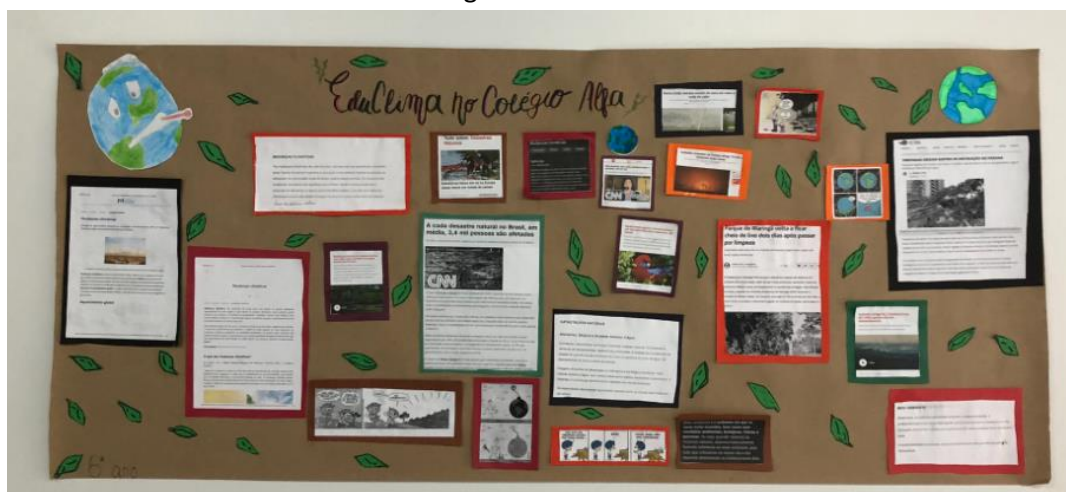
3.2 EduClima Panel

In the fourth meeting, the intervention proposal was the elaboration of a panel with current news, comic strips, images, etc. on climate change. Firstly, the students did searches and, as an assignment, presented the collected material to the class.

Thereby, a panel was elaborated, called *EduClima* (Figure 5), showcasing it in a location with great movement of people in the school space, in order to sensitize the school community about the citizens’ responsibility in the making of new rationalities that mitigate or reverse climate change.

The panel was made with simple materials, such as kraft paper, pens, colored papers, glue and scissors.

Figure 5. *EduClima* Panel



Source: The authors.

Climate change can be approached through scientific dissemination, meaning, by means of propagation of scientific informations in class, “through resources, techniques and

various means like the news and magazines, in an attempt to introduce new directions of the teaching-learning of sciences” (GONÇALVES; JULIANI; SANTOS, 2018, p. 650, own translation).

This way, specifically, at this stage of the intervention, it is possible to note the student as the protagonist of the process of becoming a critical individual facing the content addressed. Faria, Ramos and Coltri (2021) state that, in these cases, it is possible to establish a debate in class on the citizens’ fundamental rights, including “notions about climate justice and vulnerability in front of the living problem and the housing in irregular occupations of urban land involving socioenvironmental issues” (p. 10, own translation).

3.3 Disposal of batteries “*Papa-pilhas*”

In the fourth and last moment of the intervention, the students made a ludic disposal for batteries (Figure 6), using recyclable materials, such as PET bottles and colored papers. Two disposals were built and left at places of easy and frequent movement of students, teachers and school staff, in order to attract attention to the objects.

Simultaneous to the construction, explanations and discussions were made about the composition of these wastes, as well as their impacts on the environment and the correct destination for this kind of waste.

In partnership with a company in the city responsible for collecting these wastes, the batteries were taken from the *papa-pilhas*, periodically, and delivered to the correct destination, reinforcing the environmental, social and economical benefits.

Figure 6. *Papa-pilhas* for the correct disposal of batteries, with an explanatory poster.



Source: The authors.

The choice for this practical activity occurred, mainly, because the *papa-pilhas* presents itself as an extremely simple and practical collection point, beyond fulfilling its original purpose, corroborating with Ono and Rocha (2021), which is a mural for people’s awareness, in case this

one presents “informations regarding the environmental damage caused by the inappropriate disposal of batteries, address the importance of recycling, reverse logistics, etc.” (p. 06, own translation).

Oliveira and Pereira (2016) also made batteries’ disposals in a Federal Institute of Ceará (Maracanaú campus). In addition to the construction of buckets for the disposal of these wastes, the researchers also held lectures about the subject in the education institution, made partnerships with companies and involved the local community’s participation. The final result presented in the article showed that there was a withdrawal of a significant amount (49,9 kg) of batteries, thus reducing the environmental impact. These wastes were correctly destined for the reuse of the metal components in the manufacture process of new batteries, ceramic materials’ inks or fireworks. However, according to the above-mentioned authors, the main result of the research showed that there was a permanent awareness of the importance of recycling these wastes from the students and IFCE’s community and some municipal schools’ part.

4. CONCLUSION

The analysis of the pedagogical intervention (didactic sequence) allowed to conclude that the school environment plays a fundamental part in the development of students who are more critical and participatory in environmental related issues. The approach of the climate change problem has shown to be of great significance, since the climate emergency is a reality everyone already faces on a daily basis. The environmental education of children and young people may influence the planet’s living conditions in the near future.

It was possible to verify that the discussions and practices during the classes promoted a redimensioning of the students’ view on climate change, amplifying their knowledge and sensitizing them to the local and global socioenvironmental challenges.

Still, it is believed that the frequent discussion surrounding the subject within the school space enriches the student body’s education, as well as expands their critical and reflective perception before phenomena involving climate change and the disclosure of information about it in the media.

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