HYDROGRAPHIC BASINS OF THE CITY OF CAMPO GRANDE (MS, BRAZIL): MULTIPLE SPACES FOR DIALOGUES AND PRACTICES FOR COLLECTIVE ECO-EDUCATION AND ENVIRONMENTAL MANAGEMENT

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Abstract: This article describes an experience of pedagogical practice of Environmental Education related to the Hydrographic Basins of Campo Grande carried out in nine schools of Basic Education in the city. The research took place in the second half of 2020, involving 400 students and ten geography teachers. Through a participatory methodology of Environmental Education with the theme Águas de Campo Grande, action strategies were sought that stimulated the critical analysis of the student's relationship with the built space and the appropriation of existing natural resources. The results point to a dichotomized view of the Environmental Education idea since students do not perceive themselves as an integral part of where they live in, as their environmental ideas do not reflect their actions. It is possible to understand that the hydrographic basins must permeate the teaching practices in the classroom through dialogue and eco-educational practices that favor the ethical construction of the individual in the environmental management process.

Keywords: Hydrographic Basin; Environmental Education; Environmental Management; Perception; Basic Education.

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Introdution

Campo Grande is located on ten river basins and, over the last two decades, has experienced intense urbanization and, consequently, a process of anthropization and waterproofing of the soil. In contemporary times, river basins have become units of study in Environmental Education, as they encompass the analysis of planning, management, inspection, and monitoring of water resources and human activities.

Environmental Education as a teaching practice in the Brazilian and Mato Grosso do Sul curricula leads to reflections on socio-environmental phenomena that manifest themselves spatially. Therefore, it is pertinent that the school collaborates in raising awareness of the relationships established with the environment, which involves the rationality of water consumption, soil contamination, groundwater, and pollution of water sources.

In this sense, the purpose of developing the “Águas de Campo Grande” Project was to analyze the ideas of Basic Education students about Environmental Education, as well as aspects related to environmental degradation in river basins in the urban perimeter of the city of Campo Grande and its consequences reflected in the sustainability of the quality of life of the city population.

The following questions were raised as guidelines for the Project: Is the environmental ideology of the research target audience reflected in the attitudes of their actions? Does the socio-environmental configuration emerged in the studied area permeate educational practices in the classroom and at school? Is it possible to reflect, based on multiple dialogues and eco-educational practices, on references that favor the ethical construction of human beings in an environmental management process?

The “Águas de Campo Grande” project developed pedagogical activities focused on Environmental Education in nine Basic Education schools in that city, with the participation of ten Geography teachers and four hundred students. The activities happened in two stages: a) bibliographical research in the classroom with the regent teacher and b) practical activities with lecture, video, and questionnaire application, culminating in the handing in the river basin banner to the regent teacher.

The theoretical-methodological approach to Environmental Education has emerged as an essential tool for promoting training processes that stimulate reflection, awareness, and decision-making aimed at actions to confront the problems of contemporary society.

As Boff (2013) considers, "in education it is important to develop a spiritual meaning of life" (p. 109). Regarding Eco education, Boff (2013) states that “the challenge of conscious education regarding the new phase of humanity and the Earth under threat can and should help build a happy way out of this crisis” (p. 110).

Thus, Environmental Education mediated by dialogue seeks to promote respect and harmonious coexistence with the living space and encourages

students to express themselves and participate effectively in society, given that it increasingly requires positions, dialogue, and debate of ideas between institutions and their respective social actors, in the face of contemporary socio-environmental issues.

The hydrographic basin: a space for dialogue and practice for collective eco-education and environmental management

The National Water Resources Policy (Law nº. 9.433/97) has, as one of its foundations, that the river basin is the territorial unit for implementing public policies related to the exploitation of water resources (BRASIL, 1997).

Porto and Porto (2008, p. 2) state that "[...] water resources are managed by river basins throughout the national territory, whether in water bodies owned by the Union or the States". For the authors, the ideal size of the river basin incorporates all the issues of interest where human activities happen.

All urban, industrial, agricultural, or conservation areas are part of a river basin whose outlet represents all the processes in this system. What happens there is a consequence of the forms of occupation of the territory and the use of the waters that converge there.

Considering the need for planning and monitoring water resources, State Law nº. 2.406/02 (MATO GROSSO DO SUL, 2002) was created, which established the State Water Resources Policy, created the State Water Resources Management System and defined management instruments such as the State Water Resources Plan, approved in 2009.

Guerra and Cunha (2011) ensure that river basins integrate a joint vision of behavior concerning natural conditions and human activities carried out since significant changes in any of these units can generate impacts upstream, downstream, and on water flow energy from the outputs of these units.

The primary issue in river basin management is the integration of the various aspects that affect the use of water resources and their environmental protection. The river basin allows for this integrated approach. According to Yasuda (1993, p. 8), "[...] the hydrographic basin is the unitary stage of the interaction of waters with the physical environment, the biotic environment and the social, economic and cultural environment".

Modaelli (2013) also corroborates the idea that the river basin as a physical-territorial unit for planning and management is one of the basic principles for managing water resources. Due to the environmental crisis, the river and its basin constitute a motivating, timely, and current topic.

Due to the integrative nature of the dynamics that characterize environmental units, drainage basins prove to be excellent study areas for planning, considering that, in recent decades, man has been an accelerating agent for modifying processes and imbalances in the landscape, which is why these basins became units of Environmental Education study.

Guimarães (2000) considers that Environmental Education must provide practical actions on the social process in a way that enables the formation of citizens committed to the issue of environmental quality.

In this context, Environmental Education and management must be integrated, along with the other instruments, to promote the principles of water resources management based on the conception of water as a public good.

Campo Grande's Agenda 21 (CAMPO GRANDE, 2004) recognizes that shared management is an urgent need for this and future generations. In this sense, the document makes it clear that,

> If people do not participate in the governance and destinies of their future and that of their children, they will not develop, neither in terms of entrepreneurship, which is the ability to dream and make their dreams come true nor in terms of their community capacity, that is, of collective mobilization around common objectives (CAMPO GRANDE, 2004, p. 44).

It is important to note that discussions related to environmental issues in recent years have motivated the creation of standards and laws that regulate the use and protection of soil, water, flora, and fauna. Participatory management can develop collective mobilization mechanisms in favor of the effectiveness of regulatory laws.

According to Barbosa and Moreira Júnior (2018, p. 100), actions aimed at Environmental Education in the country have been under four motivations:

> The first concerns the administration of natural resources, whose regulations address the issue of conservation and preservation; the second involves the control of human pressure on the environment; the third is related to territorial planning, which includes economic, ecological, and social aspects; and the fourth aims to meet the principles present in the National Environmental Policy.

Formal education must contribute to building critical thinking, as the solution to socio-environmental problems and the quality of living spaces depend on better care for the environment. In this sense, it is of fundamental importance that education assumes a commitment to Environmental Education, devoid of the ideologies of dominant groups.

Critical consciousness begins with political participation that contributes to the exercise of citizenship in the sense of social transformation. Loureiro (1999, p. 60) conceives Environmental Education as “[...] an educational process of building

full and planetary citizenship, which aims to improve the quality of life of those involved and the consolidation of ecological ethics".

This critical Environmental Education must build "a fair and environmentally balanced world, including the social dimension, and also, an education for the formation of citizenship" (GUIMARÃES, 2000, p. 68).

Agreeing with this process, Saviani (2005) suggests that "man as a synthesis of multiple determinations and education as an instrument of social transformation, propose to equip social subjects for a transformative social practice" (p. 76).

When formal education transforms the space in which it operates through a transformative social practice, it builds the critical process it proposes. Carvalho (2012, p. 54) adds: "[...] thereby causing profound changes in the horizon of pedagogical concepts and practices".

It is an education that transcends school walls, mediating human activity and aiming at responsible actions for the world through developing knowledge, attitudes, and skills necessary to preserve and improve the quality of life and the environment.

The debate inherent to socio-environmental problems involves varied political, historical, economic, ecological, and geographic issues, presupposing the interdisciplinarity of human knowledge.

The participatory pedagogical actions and practices of Environmental Education, according to Andrade and Figueiredo (2019), "[...] involve the exercise of democratization of the classroom, with the center moving from content to a learning process for students and educators, in dialogue" (p. 134).

These pedagogical approaches expose reality through exchange, providing education for dialogue. For working on Environmental Education from the perspective of Geography, Silva (2016) argues that "[...] it is important to start from the students' reality, that is, from the place of (co)existence, where their life experiences are carried out" (p. 69).

Environmental context of the hydrographic basins in the city of Campo Grande

The journal Revista de Divulgação do Arquivo Histórico de Campo Grande/MS - ARCA mentions that "[...] History is fundamental for us to understand the central role the waters had in the birth and development of the city, from the first residents to the present day" (CAMPO GRANDE 2009, p. 4), about the relevance of Campo Grande's streams to the daily lives of Campo Grande residents.

The elemental paths for exploring the theme "Waters of Campo Grande" are "[...] the greatest value that water can have is when it mixes with human life and with the memories of those who grew up next to countless streams and through

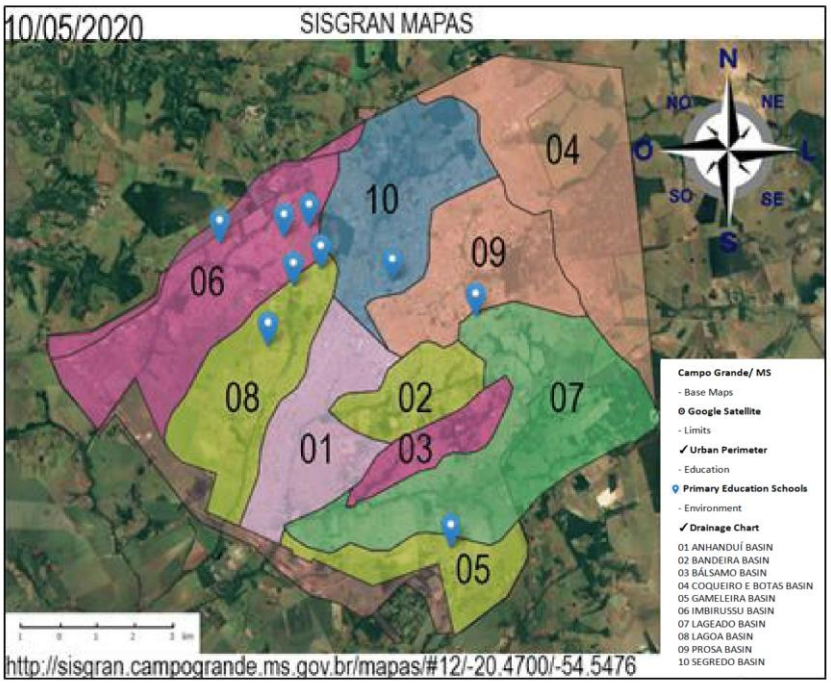
these intricacies they wrote a good part of their life stories" (CAMPO GRANDE, 2009, p. 4).

Concerning giving meaning to learning, Silva (2016, p. 70) considers that "[...] it is necessary to link life and science, interests and studies, in short, to make learning meaningful to improve environmental conditions and consequently the way a person lives." The lived space, culturally endowed with value and affection, in which the individual identifies himself, is called place.

Lisboa (2007, p. 29) explains: "[...] the place can be understood as the part of the geographic space effectively appropriate for life, the area where daily activities linked to survival and the various relationships established by men take place". The streams in the city of Campo Grande are part of the construction of the history of this place.

Picture 1 contains a map of the location of the river basins in Campo Grande with an indication of the schools participating in the Environmental Education pedagogical actions of the Project described here. Considering the river basins, the Basic Education schools are distributed as follows: 1 in the Lageado basin, 3 in the Lagoa basin, 1 in the Gameleira basin, 3 in the Imbirussu basin, and 1 in the Segredo basin.

The basins of the Anhanduí River, the Prosa Stream, and the Segredo Stream (Picture 1) hold the highest criticality, precisely where the most significant urbanization process has occurred in Campo Grande in recent decades. These streams cross the city from north to south and east to west, respectively, in a trend of increasing densification from downstream to upstream.



Picture 1: Urban river basins of Campo Grande/M. **Fonte:** Sisgran (2020).

The Campo Grande Drainage Charter (1997) recorded the social, economic, ecological, and environmental effects of the use and occupation process occurring in the urban space of Campo Grande. According to that document, the environmental impacts resulting from this process can be,

> [...] noticed and felt by the Campo Grande community, through consequences easily understood by the general public, such as loss of water sources, erosion and loss of fertile soil, waterproofing of urban soil, silting of low-lying areas, swampy land, bottoms of valleys, floodplains, streams, rivers, pollution of water, soil and air, by different types of contaminating agents [...] (CAMPO GRANDE, 1997, p. 25).

The hydrographic basins of Campo Grande, depending on the characteristics of the physical environment and land use and occupation, are considered territorial and environmental planning units, as they express problems and confrontations with necessary services and works.

The analogy of the themes worked on in the classroom with everyday life becomes essentially appropriate since Geography is part of this experience when students realize that they participate in the construction of the space, the landscape, and the place in which they live. Through this, the teacher can provide for the students to share their experiences and build their knowledge.

To this end, it is necessary to use participatory methodologies, facilitating the development of the construction of knowledge by the student as, according to Morais (2011, p. 11), "[...] visualization of the content in practice allows it to be understood more easily" and brings theory and practice together.

Method

"Águas de Campo Grande" project: pedagogical actions of the participatory Environmental Education methodology

The pedagogical actions of the participatory Environmental Education methodology were developed in nine Basic Education schools in Campo Grande, eight from the state public network and one from the private education network, in the second half of 2020. The "Águas de Campo Grande" Project included the participation of 10 Geography teachers and 400 students.

There were two main stages of the project. Firstly, bibliographical research occurred in the classroom with the leading teacher; then, participatory activities followed in the schools participating in the project, which culminated in the delivery of a banner with the title Campo Grande/MS Hydrographic Basins – Socio-environmental Analysis, with a map of the river basin areas and demonstration of the environmental issues, to use of the regent teacher.

In the first stage, in dialogued theoretical classes taught by the regent professor, through bibliographical research, the following geographic concepts were developed and contextualized:

• First class: water resources, hydrographic basin, sub-basin, micro-basin, bodies of water, river, stream, tributary, spring, headwaters;

• Second class: urbanization, use and occupation process, management unit, urban planning and environmental management, inspection, monitoring, urban environmental problems, environmental degradation, degree of criticality;

• Third class: natural resources, ecosystem, environment, nature, conscious consumption, and environmental themes: water, energy, transport, solid waste, deforestation, pollution, fire, diseases, flooding, and death of animals.

The second stage developed on the review of concepts and theoretical deepening of Environmental Education issues. It was a collective construction, mediated by participatory methodology, privileging the interdisciplinary character and integration between theory and practice. These participatory activities included a lecture, video, quiz, and delivery of gifts created from recycled materials to the students.

The lecture “Campo Grande/MS Watersheds – Socio-environmental Analysis” discussed the watersheds of Mato Grosso do Sul and the city of Campo Grande and the current environmental problems of these spaces.

The video presented topics such as water resources, types of pollution, current consumerism, fires, and environmental care. Through playful and short presentations, the purpose was to spark debate and survey ideas among students, to then respond to the questionnaire, considering ideas relating to local environmental issues and Environmental Education.

The questionnaire collected data on the perception of students about the environmental issues of the river basins in Campo Grande and their knowledge of the Environmental Education actions: four hundred questionnaires to Basic Education students aged between 8 and 16.

Through didactic tools, the process of mutual recognition between participants in pedagogical actions valued learning based on dialogue, the exchange of knowledge, and the collective construction of ideas and paths in favor of environmental management of multiple spaces for discussion, the river basins of Campo Grande.

The “Águas de Campo Grande” Project sought through participatory activities to materialize the socio-environmental configuration of the river basins in Campo Grande in Basic Education classrooms. The pedagogical activities of the participatory methodology demonstrated that it is possible to reflect, through multiple dialogues, on the references that favor the ethical construction of human beings in the environmental management process.

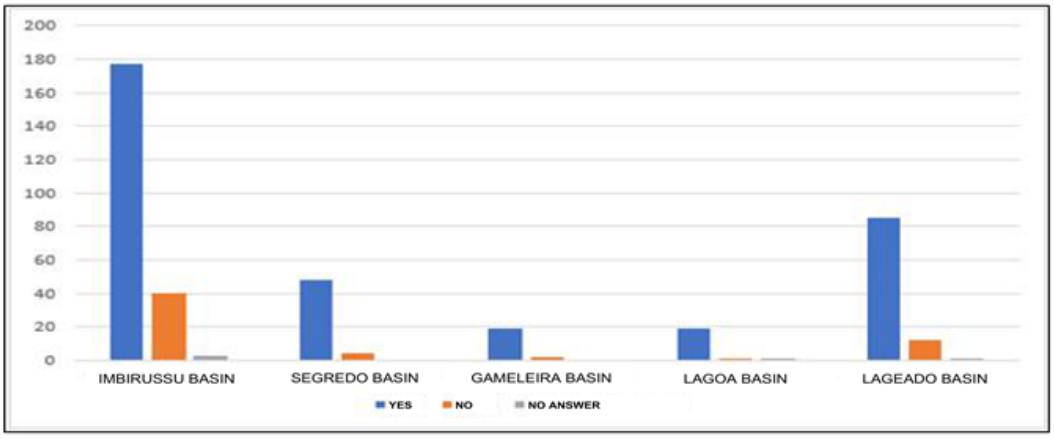
Results

Nowadays, perception has become fundamental in surveying and understanding the socio-environmental problems in the watersheds of urban spaces. As a result of the intense urbanization process, there was a certain ineffectiveness in the planning, management, inspection, and monitoring of water resources by the competent bodies.

Considering the current environmental issues, perception can help to understand the dynamics of physical-natural and social factors, along with the interaction, impacts, and consequences of these relationships. Subjects construct the space so they have some perception about it.

According to Barbosa and Félix (2020), "[...] environmental perception has been one of the guidelines through which man seeks to understand the meaning of any part of the environment with the whole" (p. 3). In this way, perception can promote an understanding of relationships with the lived and constructed space.

Pictures 2 to 6 show graphs representing the results obtained through questionnaires applied to students who participated in the project from the nine schools in the Imbirussu, Segredo, Gameleira, Lagoa, and Lajeado river basins. The data demonstrate the perception of their environmental ideas regarding Environmental Education and ecological issues in Campo Grande.

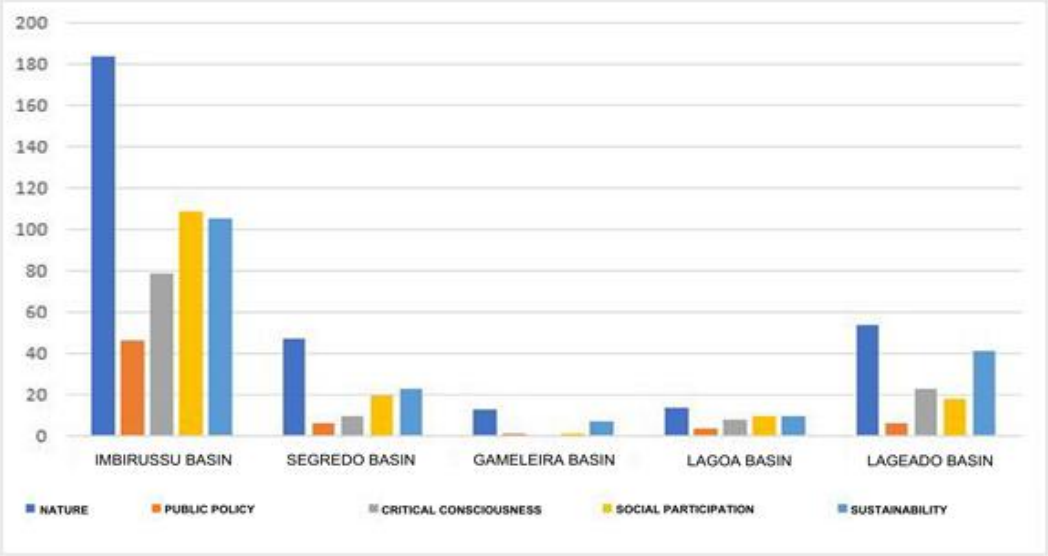


Picture 2: Do you know what Environmental Education is? **Fonte:** Barbosa (2020).

The Campo Grande Drainage Charter (1997) recorded the social, economic, ecological, and environmental effects of the use and occupation process occurring in the urban space of Campo Grande. According to that document, the environmental impacts resulting from this process can be,

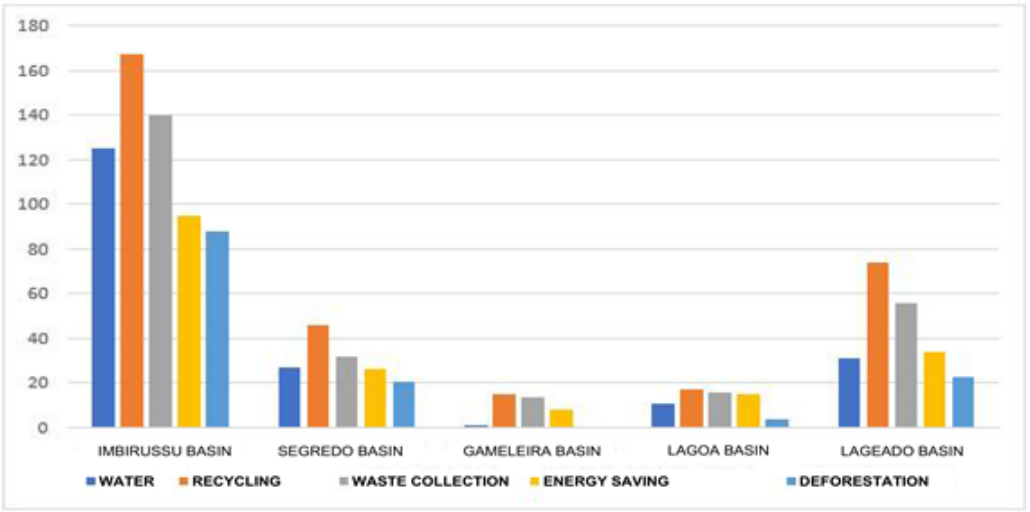
> [...] noticed and felt by the Campo Grande community, through consequences easily understood by the general public, such as loss of water sources, erosion and loss of fertile soil, waterproofing of urban soil, silting of low-lying areas, swampy land, bottoms of valleys, floodplains, streams, rivers, pollution of water, soil and air, by different types of contaminating agents [...] (CAMPO GRANDE, 1997, p. 25).

The majority of students demonstrated that they know what Environmental Education is. It should be noted, however, that some, although few in number, are unaware of the topic. In this sense, the National Environmental Education Policy - Law nº 9.795/99 considers that "[...] due to its holistic, humanistic, interdisciplinary and participatory character, Environmental Education contributes greatly to assisting the educational process, bringing the involvement of citizens in concrete actions to transform this reality" (BRASIL, 1999).



Picture 3: What terms do you relate to Environmental Education? **Fonte:** Barbosa (2020).

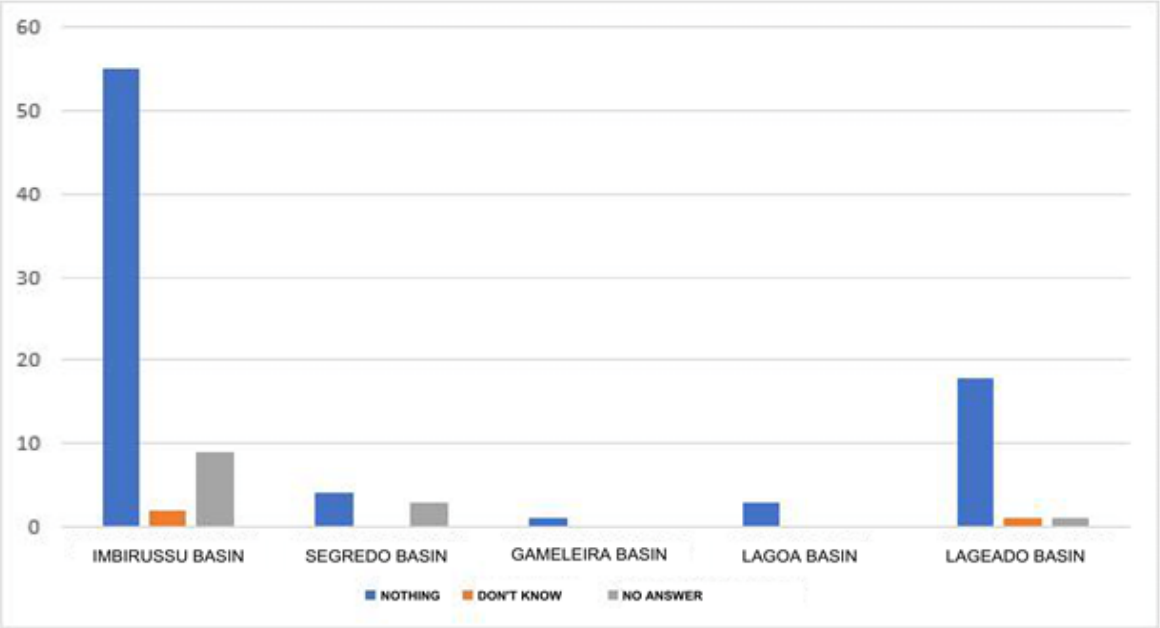
Taking into account water resources, of the terms contained in the questionnaire question, those that are most associated with Environmental Education, in the view of students participating in the "Águas de Campo Grande" project, are, in order of incidence, nature, sustainability, and social participation (Picture 3). It shows that social transformation depends on the involvement of social groups with their communities.



Picture 4: What do you relate to Environmental Education? **Fonte:** Barbosa (2020).

Considering the river basins of Campo Grande, the themes listed that relate to Environmental Education were water, recycling, garbage collection, energy saving, and deforestation (Picture 4). Altogether, all the items mentioned appear in the transversal theme of Environment; however, recycling, water, and garbage collection seem to be the elements that participants most associate with environmental education.

As the Environment is a priority transversal theme for developing Environmental Education, the school, as a space for generating knowledge and transmitting values, is at the center of the debate on sustainability. According to Moreira et al. (2013, p. 80), the school's mission is to "guide present and future generations on the unprecedented social and environmental changes that the world is currently facing".



Picture 5: What have you done for environmental education in your home or in your neighborhood? **Fonte:** Barbosa (2020).

Practical actions and sustainable attitudes in favor of Environmental Education carried out in the homes or neighborhoods where students live were not listed in any of the basins researched (Picture 5). However, critical education considers that everyone knows the topics covered and deserves opportunities for expression.

Table 1 presents a list of the environmental problems observed in the Campo Grande river basins and as raised by the students, as well as the solutions they point out as mitigating.

Table 1: Environmental problems in Campo Grande and mitigating solutions
Basins / Environmental Problems / Mitigating Solutions.

Basin	Environmental Problems	Mitigating Solutions
IMBIRUSSU	Lack of drainage and rainwater collection, garbage in vacant land and streets, polluted streams, flooding, deforestation.	Separating dry waste from wet waste, reusing water, recycling, saving water and energy, and disposing of waste in the correct place.
SEGREDO	Deforestation, trash on the streets, sewage, pollution, erosion in Sóter Park, smoke, fires, pollution, few trees, dead animals.	Saving energy and water, disposing of waste in an appropriate place, recycling, and buying reusable things.
GAMELEIRA	Deforestation, pollution, fires, garbage, smoke, rubble, blocked drains.	Garbage disposal in the correct place, energy and water saving, recycling, tree planting, cooking oil recycling.
LAGOA	Flood, erosion, garbage, fires, garbage in drains and streams, pollution, dirty streams, sewage, holes, deforestation.	Recycling, garbage collection, energy saving, water saving, not throwing garbage on the streets.
LAGEADO	Trash, plastics, and pets thrown on the street, fires, water waste, pollution, deforestation, dead animals.	Saving energy and water, collecting garbage, recycling, cleaning empty land, separating wet and dry waste, and turning off the TV when you are not watching.

Fonte: Barbosa (2020).

Here, one can see the students' environmental ideas concerning current environmental problems: difficulties common to the entire city. Environmental perception seeks to understand the meaning of part of the environment with the whole, the perception that helps the individual to perceive the environment and determines the relationship they have with the environment in which they live.

Discussion

Since 2017, the state of Mato Grosso do Sul has offered Environmental Education in schools in the State Education Network: “[...] and it must be present, in conjunction with the knowledge acquired by students, in all stages and other modalities teaching, and included in the Pedagogical Political Project” (MATO GROSSO DO SUL, 2017).

In this sense, developing knowledge about the river basins of the city of Campo Grande for Basic Education students was of utmost importance, as it brought the school and the community closer together. Furthermore, the “Águas de Campo Grande” Project is a theme of the Campo Grande community, is environmental, and could be discussed in the classroom in conjunction with other areas of knowledge.

The action of social actors in the community must provide dialogue in favor of the criticality of the effectiveness of public policies that benefit the quality of life and the solution of socio-environmental problems since “the possibilities of overcoming the socio-environmental crisis are recognized in the human vocation of dialogue” (SOUZA, 2017, p. 40).

The school, as a proponent of formal education, can transform the space in which it operates with transformative social practices through the creation of sustainable educational places related to water management, revealing:

> [...] in the care with the use of water in the physical space of the school [...]; in approaching, in an inter and transdisciplinary way, the importance of this natural asset in maintaining the biosphere, as well as the causes and consequences of human actions in the degradation and depletion of the planet's water reserves [...]; in the school-community, by encouraging environmental citizenship, stimulating responsibility and individual and collective engagement in the transformation of local and global socio-environmental conditions [...]; about the theme of environmental health and the treatment of this issue at school [...] (MOREIRA et al, 2013, p. 80 and 81).

From this perspective, the pedagogical actions and practices established and executed based on dialogue are characterized as fundamental in Environmental Education, as they “lead to the development of learning, directing the individual to a posture of conscious intervention in the face of understanding the complexity of problems arising from everyday life” (ALMEIDA et al., 2020, p. 41).

The critical citizen has to feel responsible for the place he lives in as “conscience cannot exist only for the neighbor, but for everyone” (TUCCI, 2009, p. 26). Thinking and acting at school and in the community must always seek to articulate thinking and doing, locally and globally, according to the perspective of critical thinking and transformative action.

It is clear that habits and practices of collective participation, based on dialogue, can improve the environment in which we live, as this encourages the strengthening of the exercise of citizenship and boosts critical, purposeful, and constructive participation in new ways of managing water resources.

But what is the meaning of critical Environmental Education in the field of water? The construction of dialogue begins to make sense as a political-methodological principle when there is an exchange of knowledge in search of a shared development, not one of a single meaning of Environmental Education in water management, but of different meanings and a new form of making.

According to Broch (2013, p. 101), the Environmental Educator is responsible for “[...] promoting education, capacity development, social

mobilization and information for the integrated management of water resources, as well as water management of urban and rural space [...]". The action of the Environmental Educator facilitates dialogue, as everyone is a partner in the mutual training process.

Campo Grande is a watershed, a city rich in springs, which feeds a complex of streams interconnected like interdependent veins. Regarding the preservation of water resources in Campo Grande, "the awareness of the future, of those who deserve to inherit the liquid of life contained in them, needs to be developed with combined actions of education and public policies" (CAMPO GRANDE, 2009, p. 3).

This study shows that the challenges posed to Environmental Education permeate the challenge of building effective freedom practices in reconnecting humanity with its political potential and strength as active beings in the world, public life, and the city.

Conclusion

Carrying out the Águas de Campo Grande Project in Basic Education school institutions revealed how participatory research and collective actions can contribute to the sustainable management of river basins and enhance the teaching-learning process at the same time. The efforts developed in all the project's phases revealed the importance of an approach involving local sustainability and strengthening environmental recovery with the strength of collective participation.

The research demonstrated that actions in school units can enhance and dynamize the community within the urban context of the river basin. It was considered a strategy with the power to transform social habits and ecological attitudes so that in the medium and long term, it could promote local sustainable development with local protagonists. Furthermore, it highlighted the importance of using participatory methodologies, as their contributions enhance the approach to Environmental Education.

By discussing and reflecting on the dialogue about Environmental Education practices in the school environment, it is possible to contribute, both with the need for continued training of the teaching staff and in the teaching-learning process, which involves the thematic approach with the students.

A dichotomized view was observed regarding the students' ideas about Environmental Education, especially about the scope of river basins in the context of Campo Grande, considering that, in many moments, individuals did not perceive themselves as an integral part of the place nor inserted in the built space of the river basin where they live.

Thus, there appears to be a gap in knowledge about critical Environmental Education, given that students' environmental ideas often do not reflect their actions.

Finally, the socio-environmental configuration of urban spaces must permeate educational practices in the classroom and at school through multiple dialogues and eco-educational actions that favor the ethical construction of human beings in an environmental management process.

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