THE ROLE OF THE TEACHER AT EPMT CEMEAM IN THE CONTEXT OF GLOBAL ENVIRONMENTAL INSTABILITY

https://doi.org/10.56238/sevened2024.041-036

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ABSTRACT
Extreme and unpredictable environmental events have attracted the attention of teachers who address environmental issues, specifically in their disciplines or through interdisciplinary activities. In recent years, the Amazon, for example, has faced extraordinary river ebb and flow. These phenomena directly impact navigability, essential for the movement of people and goods, changing not only logistics but several other socio-spatial dynamics in the region. These events, largely attributed to climate change, challenge the predictability of an area once regarded as environmentally stable, evidencing the urgency of updating disciplinary content with recent data, often absent from textbooks in force during the period of validity of the National Plan for Books and Didactic Material. In the context of Technology-Mediated On-site Teacher, offered by the Amazonas Education Media Center, the teaching modality adopted in its coverage area depends on materials prepared by teachers based on their lesson plans. Given this dynamic, the question arises: what is the role of these teachers in the face of the environmental instability faced by the region - and the world - concerning updating the content they teach? Based on specific objectives, qualitative and exploratory research was carried out, with descriptive and interpretative elements, which included documentary analysis and action research, guiding the investigation in the search for an answer to the central question.

Keywords: Climate Change. Technology-Mediated Teaching. Content Update. Environmental Instability.

INTRODUCTION

The International Amazon spans nine South American countries and faces complex logistical challenges due to its configuration and geographical characteristics. In Brazil, the Legal Amazon includes nine states, with Amazonas standing out for its vast area and ecological diversity. The dense forest, extensive river network, and limited road infrastructure make the transportation of people and goods challenging, especially in isolated areas, affecting public policies and essential services such as education in riverside communities.

In recent years, severe drought in the rivers of the Amazon has drastically altered river logistics, compromising mobility and access to fundamental services. Such events, considered unstable, highlight the need for innovative solutions and draw the attention of teacher from TV studios who address environmental issues, both in a curricular way, in their disciplines, and in an interdisciplinary way, with teachers from other areas.

In the Technology-Mediated On-site Teacher (EPMT) of the Amazonas Education Media Center (CEMEAM), teachers discuss environmental issues at various scales, directly with students from Amazonian daily life. The concern that emerges, and that guides this research, is: what is the role of the EPMT CEMEAM teacher in the face of global environmental instability, concerning the updating of curricular contents? This question motivated the present study, organized according to the objectives listed below.

GENERAL OBJECTIVE

To analyze the role of teachers from a TV studio working in the Technology-Mediated Teaching (EPMT) model at CEMEAM in the context of global environmental instability, especially regarding the update of their curricular content.

SPECIFIC OBJECTIVES

To contemplate the General Objective, we sought a) to describe the scope of action of the EPMT CEMEAM, as well as b) to characterize the specificities and methodological principles of the teaching modality within the institution, in addition to c) to identify and describe the specific professional and pedagogical characteristics of the EPMT teacher from a tv studio in its context and, finally, d) to list themes among the curricular contents that denote the relationship between contemporary environmental instability and the need to update the contents of the classes, based on the example of Geography.

THEORETICAL FOUNDATION

Global environmental instability, intensified by climate change, requires a reconfiguration of pedagogical practices, especially in Amazonian contexts. Phenomena such as unusually low river levels and other challenges related to climate change affect not only socio-spatial dynamics but also the way school content is approached. Milton Santos (2000) highlights the importance of understanding the relations between society and nature to critically analyze the impacts of environmental transformations and their socioeconomic consequences. In this sense, the constant updating of educational content becomes indispensable, especially for disciplines such as Geography, which studies the impact of these interactions on local and global scales.

In the Amazonian context, Technology-Mediated On-site Teacher (EPMT) emerges as an innovative pedagogical solution that uses Information and Communication Technologies (ICTs) to democratize access to education in remote regions. According to Belloni (2009), the integration of technologies in teaching promotes the overcoming of geographical barriers, allowing the content to reach students in areas of difficult access. At EPMT, teachers act as mediators of knowledge, using technology as a tool to connect students and content in a synchronous and contextualized way (Moran, 2012). This practice requires a methodological adaptation that incorporates interdisciplinarity and pedagogical innovation.

The role of the teacher gains centrality in this teaching model. Thiollent (2011) argues that the teacher is not only a transmitter of knowledge, but a transforming agent, capable of adapting content and methodologies to the needs of the context. At EPMT, EPMT teachers need to combine traditional pedagogical skills with specific technical competencies, including the ability to create content appropriate to the technology-mediated format, as well as staying current in the face of rapid global change. Bardin (2011) reinforces the need for a critical and systematic analysis of contents, especially in a world marked by continuous transformations.

Interdisciplinarity also plays a crucial role in tackling socio-environmental issues. According to the National Common Curriculum Base (BNCC), topics such as climate change, food security, and economic inequalities must be addressed in an integrated manner, connecting different areas of knowledge to promote a more contextualized and meaningful education (Brasil, 2018). This approach not only enriches learning but also prepares students to understand and face the challenges of the present and the future.

Finally, curricular adaptation and content updating emerge as indispensable strategies to respond to the demands imposed by environmental instability. In addition to

aligning the contents with local realities, this adaptation allows for a more critical and engaged citizenship education. As stated by Flick (2009) and Cellard (2008), the integration between qualitative research and pedagogical practice enables a deeper understanding of social and environmental phenomena, favoring the construction of an education that reflects contemporary needs.

METHODOLOGY

The research had a qualitative and exploratory nature, with descriptive and interpretative elements. The qualitative approach allowed the investigation of the experiences and perceptions of the teachers, and authors of this approach, while the exploratory approach sought to understand the structures and specificities of the EPMT in the context of CEMEAM. According to Flick (2009), qualitative research is adequate to explore complex and social phenomena, such as the role of the teacher and his pedagogical performance.

It also included the analysis of institutional documents, such as regulations, pedagogical manuals, and CEMEAM reports. The documentary analysis allowed the identification of guidelines and methodologies used, as suggested by Cellard (2008), who highlights the importance of documents as primary sources for understanding educational contexts.

Action research has also been developed as a collaborative process, in which researchers (teachers and pedagogues, in this case) work directly with other teachers from EPMT CEMEAM to investigate, reflect, and intervene in pedagogical practices related to environmental instability. Sessions were held among the authors, to identify challenges. According to Thiollent (2011), action research is an appropriate methodology when the objective is to promote changes and transformations in a specific context through the active participation of those involved, combining action and reflection.

Lesson plans, teaching materials, and other documents were discussed based on the content analysis technique (Bardin, 2011), aiming to identify how themes of environmental instability are inserted into the curricula and addressed by teachers. The analysis allowed the mapping of the environmental approach with contemporary challenges.

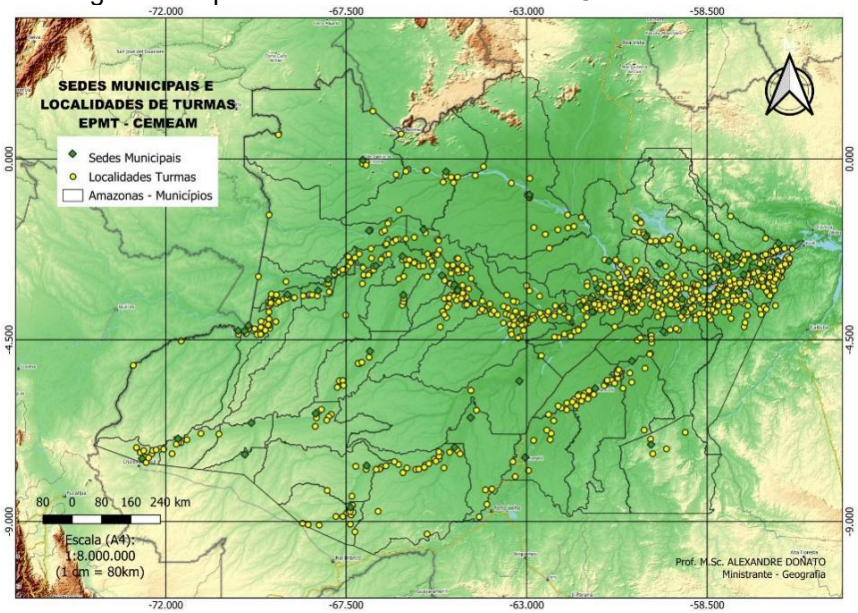
RESULTS AND DISCUSSIONS

THE AMAZONAS EDUCATION MEDIA CENTER (CEMEAM)

CEMEAM, created by the Government of the State of Amazonas through its Department of Education and School Sports (SEDUC), in 2007, offers innovative education in the public network using Information and Communication Technologies (ICTs) with a focus on interactivity. The Center combines face-to-face classes and satellite videoconferences, using media for synchronous and asynchronous classes, taught by expert teachers and mediated by On-site Teachers. The broadcasts include lectures and courses in partnership with other agencies, adapting to the Amazonian geographical context (CEMEAM, 2024a).

Classes are broadcast via Internet Protocol Television (IPTV), in the modality of Technology-Mediated On-site Teacher (EPMT), reaching 60 municipalities, covering 813 locations (municipal headquarters, towns, communities, and indigenous villages), and managed by 111 public schools. These schools coordinate 1,932 classes, serving 25,374 students in an area of 1,571,000 km² of the Brazilian and international Amazon (Figure 1). The levels of education include Elementary School II, High School, in the regular modalities, and Youth and Adult Education (EJA), in the afternoon and night shifts (CEMEAM, 2024b).

Figure 1 – Spatial distribution of the EPMT CEMEAM classes



Source: Silva, 2024, Silva et al., 2024.

TECHNOLOGY-MEDIATED ON-SITE TEACHING (EPMT)

EPMT is a teaching modality that integrates communication and live streaming technologies to connect EPMT teachers and students who are physically distant, but who remain in a school environment, such as classrooms, coordinated by On-site Teachers and,

in the case of EPMT CEMEAM, all remotely accompanied by pedagogical advisors. This creates a hybrid environment in which technology works as a means to ensure the simultaneous presence of those involved, allowing synchronous interactions. This modality is often used in areas with difficult access to democratize education and allow students in isolated regions to attend classes transmitted from larger urban centers (MEC, 2018).

According to Gomes et al. (2019), EPMT differs from traditional teaching by its ability to overcome geographical barriers, using real-time transmission technology (such as IPTV and videoconferences), allowing students to follow and interact with the content simultaneously, such as in a face-to-face environment. According to the project of this type of study for High School (Amazonas, 2014), the assumptions of the EMPMT are interactivity, face-to-face, and mediation. Regarding the first assumption, Mello (2017) explains that interactivity by videoconference enables virtual presence in classes and communication between teachers, students, and the pedagogical advisory team. Mediation occurs continuously, with the teacher from a TV studio playing the role of mediator between the students and the contents (from the transmission studio at CEMEAM's headquarters), while the On-site Teacher offers support to the activities carried out in the classroom (in person in the contemplated locations), both accompanied by the Pedagogical Advisory (from CEMEAM's headquarters).

EPMT differs from Distance Learning (DE) mainly by the physical presence of students in a school environment, where teaching is mediated by digital technologies to simulate face-to-face proximity and expand access to educational resources (Moran, 2012). Distance education, on the other hand, takes place completely remotely, without sharing physical space between teachers and students, with interactions that can be asynchronous or synchronous, depending on the model adopted (Belloni, 2009; Litto and Formiga, 2012). While distance education values student flexibility and autonomy, EPMT combines technology and face-to-face monitoring for a structured experience.

In this context, it emerges to analyze the role of the EPMT CEMEAM EPMT teacher from a TV studio, since he, in addition to acting as a mediator between students and knowledge objects, is responsible for co-producing, technically, contents and forms of presentation adapted to the specificities of the modality. In addition, it is subject to a set of standards, rules, and procedures specific to the technical characteristics of transmission of its classes that go beyond the requirements of traditional didactics and methodology.

THE TEACHER FROM A TV STUDIO AT EPMT CMEAM

The EPMT CEMEAM EPMT teacher is from a TV studio and is an education professional responsible for creating, adapting, and mediating content and pedagogical practices using digital technologies for the specific reality of the modality in question. This teacher cannot be limited to traditional practices, since he works together with developers of television resources (video and audio producers, transmission technicians, among other professionals), adjusting them to the needs of their lesson plans. According to the experience of the authors of this study, at EPMT CEMEAM it is up to the teacher from a TV studio among other responsibilities:

- Be able to develop pedagogical content adapted to the specific modality: this point emphasizes the need for the teacher to adapt the content to the specificities of the EPMT, which requires a different approach concerning traditional On-site Teachers. Adapting content means considering the transmission format, interaction limitations, and accessibility of the material for students in remote regions. This skill is essential for learning to be meaningful and relevant while respecting local and technological realities.
- Present instructional autonomy and innovation in their lesson plans compatible with the resources they have at their disposal: instructional autonomy is essential for the teacher to make assertive decisions, adapting methodologies according to the conditions and limitations of the platform and available resources. Innovation is another important aspect, as it allows the creation of differentiated methods and engaging strategies that make classes more attractive. In this sense, the teacher must be creative and flexible to use technological resources in the best possible way.
- Collaborate interdisciplinarily with other teachers working in the modality: in addition to being a necessity due to the Common Curricular Units (UCC), interdisciplinary collaboration is a practice that adds value to learning, especially in a technology-mediated teaching model. By collaborating with other teachers, the teacher can enrich their content, integrating different perspectives and creating more complete learning experiences. In the context of the EPMT, this practice is particularly useful to reinforce cohesion between the contents and enable the creation of an integrated curriculum aligned with the educational needs of the region.
- Present communication skills for the transmission of their classes: Communicative competence is a fundamental requirement for the EPMT teacher at CEMEAM, considering that classes are broadcast in television format and later distributed on digital platforms, subject to public scrutiny. This exposure requires the teacher to be

able to present content in a clear, precise, and accessible way, always attentive to objectivity and the pedagogical adequacy of communication.

- Working collaboratively with On-site Teachers, Pedagogical Advisory, and technical production teams: in the context of the EPMT, collaboration with different professionals is essential. On-site Teachers, pedagogical advisors, and technical teams are key players in the process, and the EPMT teacher needs to align with them to ensure that the content and methods are executed cohesively and effectively. This teamwork allows the content to be adjusted for a more fluid and efficient transmission, in addition to ensuring that any difficulties are solved together.
- Meet schedules, dates, and deadlines aware of the unfolding of the production flow: punctuality and meeting deadlines are essential to maintain the flow of content production in technology-mediated environments, where there is a live broadcast structure in a context that is both pedagogical and technical. The teacher needs to be aware of the impacts of any delays, which can compromise the quality of the transmission and the progress of classes for other groups. Thus, commitment to deadlines is essential for the success of the program.
- Constantly update the contents of their disciplines: the continuous updating of content is essential for classes to keep up with rapid social, technological, and environmental changes, offering a contextualized and meaningful education for students in the Amazon region. This practice ensures that the topics covered are in tune with the transformations of the contemporary world, allowing students to understand not only the local reality but also its relationship with the global scenario.

The need for updating becomes even more pressing in disciplines that explore the relationship between society and nature, especially when dealing with the environmental and socioeconomic consequences of these interactions, which are fundamental for a critical understanding and the formation of conscious and engaged citizens. Geography, a discipline especially interested in the consequences of the encounter between society and nature, explores contents that are subject to constant change in both its human and physical analyses.

THE EPMT CEMEAM AND THE CONSTANT NEED TO UPDATE CONTENTS: AN EXAMPLE FROM GEOGRAPHY

It is important to emphasize the constant need to update the content at EPMT CEMEAM, highlighting that this urgency is greater due to the model that combines

synchronous classes and that, later, are made available on online platforms, requiring current and relevant information. In Geography, which studies environmental phenomena and their interactions between the local and global spheres, the growing environmental instability makes it even more important to continuously update to reflect changes in new data. The term "environmental instability" here refers to continuous and unexpected changes in spatial conditions, whether physical or social, that challenge traditional geographic dynamics.

Having analyzed the EPMT CEMEAM Class Sequence Schedules (CSA) for the year 2024 (CEMEAM, 2024c), with attention to the knowledge objects of Geography classes and their respective details in Elementary School II (6th to 9th grades), eight unifying themes of various contents of the National Common Curricular Base (BNCC) (Brazil, 2018), which show environmental instability and the constant need to update the classes of this discipline. These topics are listed below, accompanied by examples of skills relevant to this level of education:

Climate Change and Natural Catastrophes: Global climate change affects ecosystems, populations, and economies, resulting in phenomena such as hurricanes, desertification, rising sea levels, and forced migrations. The analysis includes direct (e.g. floods) and indirect (e.g. food crises) impacts, in addition to the need for populations to adapt.

Skills:

- EF06GE13: Analyze consequences, advantages, and disadvantages of human practices in climate dynamics (heat island, etc.).
- EF08GE15: Analyze the importance of the main water resources in Latin America (Guarani Aquifer, Río de la Plata, Amazon and Orinoco River basins, cloud systems in the Amazon and Andes, among others) and discuss the challenges related to water management and commercialization.

Migration and Refugees: Armed conflicts, economic crises, and environmental disasters generate significant migratory flows. Cases such as refugees from Syria and Central America reflect the political and economic instability that transforms social and demographic geography.

Skills:

- EF08GE01: To describe the routes of dispersion of the human population across the planet and the main migratory flows in different periods of history, discussing the

historical factors and physical-natural conditioning factors associated with the distribution of the human population across the continents.

- EF08GE04: To understand migration flows in Latin America (voluntary and forced movements, as well as factors and areas of expulsion and attraction) and the main migration policies in the region.

Geopolitical Conflicts and Border Redefinition: territorial disputes, such as in Ukraine and the South China Sea, modify borders and political configuration, affecting sovereignty and control over natural resources. Current Geopolitics is marked by the rise of new economic and military powers, altering alliances and territorial influences.

Skills:

- EF08GE11: To analyze areas of conflict and tensions in the border regions of the Latin American continent and the role of international and regional cooperation organizations in these scenarios.
- EF09GE08: To analyze territorial transformations, considering the movement of borders, tensions, conflicts, and multiple regionalities in Europe, Asia, and Oceania.

Globalization and (De)industrialization: Globalization, with the transfer of industries to countries that allow lower operating costs, causing environmental impacts in new spaces, reorders territorialities. Formerly industrial regions, such as parts of the U.S. and Europe, face deindustrialization and the need to reinvent themselves economically.

Skills:

- EF08GE13: To analyze the influence of scientific and technological development on the characterization of the types of work and the economy of urban and rural spaces in America and Africa.
- EF09GE12: Relate the urbanization process to the transformations in agricultural production, the expansion of structural unemployment, and the growing role of financial capital in different countries, especially Brazil.

Food Security and Agricultural Crises: food insecurity is caused by extreme weather phenomena, conflicts, and unequal economic policies, impacting land use and the organization of rural and urban spaces. The instability in agricultural commodity prices reflects the interdependence and vulnerability of the global food system.

Skills:

- EF06GE10: Explain the different forms of land use (land rotation, terracing, embankments, etc.) and appropriation of water resources (irrigation system, treatment, and distribution networks), as well as their advantages and disadvantages in different times and places.
- EF09GE13: To analyze the importance of agricultural production in the urban-industrial society in the face of the problem of global inequality of access to food resources and raw materials.

Accelerated Urbanization and Urban Environmental Problems: Disorderly urban growth, especially in developing countries, brings challenges in infrastructure, sanitation, transportation, and sustainability. Problems such as pollution, heat islands, and socio-spatial segregation stem from accelerated urbanization and instability in the occupation of urban space.

Skills:

- EF08GE17: To analyze socio-spatial segregation in urban environments in Latin America, with special attention to the study of favelas, wetlands, and risk zones.
- EF06GE07: Explain the changes in human interaction with nature from the emergence of cities.

Economic Inequalities and Social Space: the concentration of income and the increase in social inequalities are manifested in geographic space, creating economic and social contrasts within territories, especially in large metropolises. These factors result in social tensions, environmental impacts, and transformations in the spatial configuration of the regions.

Skills:

- EF07GE06: Discuss to what extent the production, circulation, and consumption of goods cause environmental impacts, as well as influence the distribution of wealth, in different places.
- EF09GE09: To analyze the world economic patterns of production, distribution, and exchange of agricultural and industrialized products, regarding the United States of America and the countries called BRICS (Brazil, Russia, India, China, and South Africa).

Energy Crises and Conflicts over Natural Resources: disputes over energy sources, such as oil, gas, and water, in regions such as the Middle East and Sub-Saharan Africa,

influence geopolitics and economic and social stability. The energy transition to renewable sources also impacts land use and regional economic configurations.

Skills:

- EF08GE20: To analyze characteristics of countries and groups of countries in America and Africa regarding population, urban, political, and economic aspects, and to discuss social and economic inequalities and pressures on nature and its wealth (its appropriation and valuation in production and circulation), which results in the dispossession of these peoples.
- EF09GE18: To develop maps or other forms of cartographic representation to analyze urban and rural networks and dynamics, territorial planning, cultural contexts, way of life and land uses, and occupation of Africa and America.

Each BNCC skill, such as "EF09GE18", for example, is composed of an alphanumeric code that indicates the level of education (EF – Elementary School), the year of study (09 – 9th grade), the curricular component (GE – Geography) and the number of the specific skill within the skill set for the given year and curricular component (18 – 18th skill). The skills are distributed, within each year, in sets of Thematic Units and Knowledge Objects.

CONCLUSION

This study highlights the crucial role of a teacher from a TV studio working within the Technology-Mediated Teaching model at CEMEAM in ensuring that educational content remains current and contextually relevant in the face of global environmental instability. Their pedagogical responsibilities extend beyond content transmission to include content creation, interdisciplinary collaboration, and technological adaptation. Ultimately, their work fosters environmental awareness and prepares students in the Amazon for the challenges of a rapidly changing world.

The results of the research demonstrated that the constant need for curricular updating is not an exclusive challenge of Geography, but a demand transversal to several disciplines. The study showed that environmental instability, by altering socio-spatial dynamics, comprehensively impacts teaching, requiring teachers not only a continuous commitment to the renewal of knowledge but also the development of innovative pedagogical strategies to deal with constantly changing content. In this way, the study contributes to the understanding that the performance of the EPMT CEMEAM teacher is

fundamental for the formation of critical and well-informed students about contemporary environmental challenges.

From an academic and social point of view, the findings of this research reinforce the relevance of educational policies that encourage and enable the continuous updating of EPMT teachers. For society, the dissemination of updated and contextualized content in EPMT CEMEAM contributes to the development of critical environmental awareness in students, enabling them to understand and face global changes. In the academic sphere, the study suggests that more research be carried out to deepen the understanding of the impacts of the EPMT modality on the training of students and the quality of education offered in the Amazon regions.

Like any investigation, this study has limitations. The main one lies in the scope of the data analyzed, restricted to the official documentation of CEMEAM and the experience of the author teachers. Future studies may expand this investigation to include comparative analyses with other teaching modalities or even research that evaluates students' perception of the effectiveness of updating the content taught. In addition, it is recommended that further research explore the impact of the continuing education of EPMT teachers on the quality of Education offered at EPMT CEMEAM.

Therefore, this study does not intend to end the discussion, but to open the way for more in-depth reflections on the dynamics of technology-mediated education in contexts of environmental instability, encouraging the expansion of debates and innovative pedagogical practices that respond to the contemporary challenges of education in the Amazon.

ACKNOWLEDGMENTS

To the Department of Education and School Sports of Amazonas (SEDUC-AM) and the Center for Education Media of Amazonas (CEMEAM), as well as to their managers, pedagogical teams, and fellow teachers of Technology-Mediated On-site Teachers (EPMT), teaching and face-to-face, whose dedication and protagonism in conducting the various curricular components have been fundamental for the promotion of quality Education, even in the face of the challenges imposed by the vast territorial extension and the diversity of the Amazonian reality.

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