

RIO ABAIXO, RIO ARRIBA: AN EDUCATIONAL GAME FOR TEACHING ENVIRONMENTAL IMPACTS ON THE PARNAÍBA RIVER

RIO ABAIXO, RIO ARRIBA: JOGO EDUCATIVO PARA O ENSINO DE IMPACTOS AMBIENTAIS NO RIO PARNAÍBA

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ABSTRACT: Environmental Education in schools is essential for fostering a critical understanding of socio-environmental interactions, particularly when combined with playful and regionalized teaching strategies. This study aimed to develop and evaluate the applicability of the board game “Rio Abaixo, Rio Arriba” for teaching environmental impacts associated with the Parnaíba River to 6th-grade elementary school students. The qualitative-applied research involved 30 students from a state public school in Teresina, Piauí, Brazil. The pedagogical intervention included an expository lecture (50 min), pre- and post-intervention questionnaires, and two rounds of the board game, which features 57 spaces integrating geographic features, human activities, and reward/penalty mechanics. In the perception diagnosis, waste disposal, sewage discharge, and riparian deforestation emerged as the most critical issues (70% of indications each; n=21), whereas predatory fishing was underestimated by students (76.7% rated it as minor impact; n=23). Regarding the evaluation of the educational tool, 60% (18/30) of students reported that the game facilitated learning, and 70% (21/30) rated the methodology as excellent, reaching 96.7% positive or neutral approval. The findings demonstrate high acceptance of the activity and suggest that regionalized playful learning can enhance Science education and environmental awareness in basic education.

Keywords: Environmental education. Didactic game. Science education. Playful learning. Teaching resources.

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RESUMO: A Educação Ambiental no ambiente escolar é fundamental para promover a compreensão crítica sobre as interações socioambientais, especialmente quando articulada a estratégias didáticas lúdicas e regionalizadas. Este estudo objetivou elaborar e avaliar a aplicabilidade do jogo educativo “Rio Abaixo, Rio Arriba” no ensino de impactos ambientais relacionados ao rio Parnaíba junto a estudantes do 6º ano do Ensino Fundamental. A pesquisa, de natureza qualitativo-aplicada, envolveu 30 alunos de uma escola pública estadual de Teresina, Piauí. A intervenção pedagógica compreendeu uma palestra expositivo-dialogada, aplicação de questionários pré e pós-intervenção e a execução do jogo de tabuleiro, composto por 57 caselas que integram aspectos geográficos da bacia, ações antrópicas relacionadas a impactos ambientais e mecanismos de orientação, punição e premiação. No diagnóstico de percepção, o lançamento de lixo, a presença de esgoto e o desmatamento da mata ciliar destacaram-se como os problemas mais preocupantes (70% de indicações cada; n=21), enquanto a pesca predatória foi subdimensionada pelos alunos (76,7% classificaram como pouco prejudicial; n=23). Quanto à avaliação do recurso lúdico, 60% (18/30) dos estudantes afirmaram que o jogo facilitou a aprendizagem dos conteúdos e 70% (21/30) classificaram a metodologia como ótima, somando 96,7% de aprovação positiva e neutra. Os resultados indicam elevada aceitação da atividade e sugerem o potencial da contextualização territorial lúdica para dinamizar o ensino de Ciências e fortalecer a sensibilização conservacionista na Educação Básica.

Palavras-chave: Educação ambiental. Jogo didático. Ensino de Ciências. Aprendizagem lúdica. Recursos didáticos.

1 INTRODUCTION

Environmental issues have assumed an increasingly prominent role in educational contexts due to the need to understand the relationships between society and the environment and their consequences for natural resources. In Brazil, the National Curriculum Parameters incorporated the environment as a cross-cutting theme, encouraging its integration across different curricular components and its connection to students' realities (BRASIL, 1998). Subsequently, the National Environmental Education Policy (PNEA) established environmental education as an integrated, continuous, and permanent educational practice across different levels and modalities of formal education (BRASIL, 1999).

Environmental education is not limited to the transmission of information about environmental problems. Nunes (1998) describes it as an integrated process related to interactions between human beings and the environment, whereas Guerra and Abílio (2006) emphasize its interactive, participatory, and critical nature. Moura (2009) highlights the articulation of different forms of knowledge in the construction of environmental thinking, while Leff (2006) relates the complexity of environmental issues to the need for interdisciplinary methods. From this perspective, school-based approaches can integrate

ecological, social, cultural, and economic dimensions (PHILIPPI JR.; ROMERO; BRUNA, 2004).

In science education, geographic and territorial contextualization can bring school content closer to situations experienced by students. The use of local river systems and regional ecosystems can foster scientific literacy and strengthen affective bonds and a sense of belonging (DIAS et al., 2021). The Parnaíba River provides favorable conditions for this type of approach because of its historical, economic, and environmental importance to the state of Piauí and its direct relationship with different municipalities and local populations. At the same time, environmental changes observed along its course allow the river to serve as an organizing element linking scientific knowledge, everyday life, and environmental education.

The incorporation of environmental content into schools, however, requires strategies that move beyond exclusively content-centered approaches or rote memorization (SANTOS et al., 2021). Guimarães (2008) draws attention to educational practices that reduce environmental education to the transmission of information about behaviors considered appropriate. Barcelos (2008), in turn, emphasizes the importance of creating spaces for interaction and participation that are consistent with the values discussed throughout the educational process. Active and playful methodologies, such as educational and board games, have emerged as alternatives capable of placing students at the center of the learning process and fostering agency, autonomy, and critical thinking (DIAS et al., 2021; SANTOS et al., 2021; SMANIOTTO et al., 2022; PINTO et al., 2025).

Play-based activities represent a promising approach for addressing this content. Play is part of child development and can promote interaction, autonomy, and sociability (OLIVEIRA, 2002). In educational settings, game-based situations can bring students closer to school content in an engaging manner (KISHIMOTO, 1994). Caillois (1986) associates the playful dimension with freedom and spontaneity, whereas Ronca (1989) emphasizes its contribution to different aspects of knowledge construction. Educational games focused on biodiversity and regional environmental impacts have shown considerable potential to stimulate students' interest, strengthen concept retention, and encourage conservation-oriented behaviors across different Brazilian biomes and contexts (DIAS et al., 2021; SANTOS et al., 2021; BUENO et al., 2024; PINTO et al., 2025; ALMEIDA et al., 2026).

Against this background, the present study aims to develop and evaluate the applicability of an educational board game (Rio Abaixo, Rio Arriba) as a teaching resource for

addressing environmental impacts associated with the Parnaíba River among sixth-grade students at a public school in Teresina, Piauí, while also examining students' perceptions of their experience using the game as a learning strategy.

2 MATERIALS AND METHODS

2.1 STUDY AREA AND CHARACTERIZATION OF RESEARCH PARTICIPANTS

The Parnaíba River basin was used as the geographic reference for the study. The river rises in the Chapada das Mangabeiras and extends for approximately 1,485 km, forming an important river system in northeastern Brazil. According to Baptista (1989), the basin lies mainly in the state of Piauí, with portions extending into Maranhão and Ceará. Based on its longitudinal extent, the river is divided into three reaches: Upper Parnaíba, from the headwaters to the Boa Esperança Dam; Middle Parnaíba, from the dam to the confluence of the Poti and Parnaíba rivers in Teresina; and Lower Parnaíba, from this confluence to its mouth in the Atlantic Ocean (DIAS, 2004).

The basin spans a transition between semiarid and humid conditions, accompanied by variations in vegetation, including steppe formations, seasonal forests, and Cerrado (IBGE, 1996). The river supports multiple uses, including water supply, irrigation, transportation, power generation, agriculture, and fishing.

The development of the game encompassed 14 municipalities and strategic locations along the river course: Santa Filomena, Ribeiro Gonçalves, Uruçuí, Porto Alegre do Piauí, Guadalupe, Floriano, Amarante, Palmeirais, Nazária, Teresina, União, Miguel Alves, Luzilândia, Porto, and the Parnaíba Delta, preserving the territorial scope used in the original study.

The practical intervention was conducted in September 2012 at Unidade Escolar Deputado Tertuliano Milton Brandão, a state public school located at Rua Anchieta, No. 2401, Dirceu Arcoverde I neighborhood, Teresina, Piauí. The participants comprised a purposive sample of 30 students regularly enrolled in the sixth grade of Elementary School, a stage in which water- and ecosystem-related content is included in the Science curriculum. Prior to implementation, the study was submitted to and approved by the Ethics Committee of the Federal University in March 2010, before the implementation of the “*Plataforma Brasil*” system.

2.2 DEVELOPMENT OF THE EDUCATIONAL GAME “RIO ABAIXO, RIO ARRIBA”

The game was developed based on the principles of play-based learning as a resource for bringing students closer to school content and on the use of regionally contextualized teaching materials (KISHIMOTO, 1994; OLIVEIRA, 2002; SANTOS et al., 2021). The physical structure of the game “Trilhas da Liberdade”, developed by environmental analysts from the Brazilian Institute of the Environment and Renewable Natural Resources in PiauÍ (IBAMA-PI), was used as a reference and adapted to address the hydrological and socio-environmental context of the ParnaÍba River.

The thematic content was selected between March and June 2012 through a literature review and the collection of information on Environmental Education, the ParnaÍba River, and environmental impacts associated with its course. Photographic collections available on regional websites and documentaries were consulted, and field photographs were produced by the research team along the ParnaÍba River in Teresina and in its Delta, using a 5-m aluminum boat equipped with a 15-hp outboard motor. Thirteen environmental themes were selected: solid waste and other pollutants, recycling, riparian forest removal, wildlife, predatory fishing, fish spawning season, mangrove destruction, water use and importance, IBAMA environmental enforcement, erosion, siltation, dredging, and hydropower generation. The selection sought to represent situations observed and/or discussed in different locations associated with the ParnaÍba River.

The Rio Abaixo, Rio Arriba game was structured as a path-based board game containing 57 numbered spaces. The spaces, which include images and explanatory texts, represent cities along the basin, ecological characteristics of the river, and problem situations governed by a color-coded system distinguishing three types of situations: 1) red for penalties associated with environmentally degrading actions, which could result in missing a turn or moving backward along the path; 2) purple for explanatory stops; and 3) yellow for rewards associated with sustainable actions, allowing players to advance along the path. The game uses one die and individual markers and was designed for two to four players per board (Figure 1).

The environmental problems incorporated into the board path included, among others, removal of riparian vegetation, erosion, siltation, wildfires, fishing during the fish breeding season, waste disposal, water pollution, and hydropower generation at the Boa Esperança Dam.

The texts in the spaces were written in accessible language for school students and linked actions, environmental consequences, and guidance on natural resource conservation.

Figure 1 – Board layout and path structure of the educational game “Rio Abaixo, Rio Arriba”, used with sixth-grade students at Unidade Escolar Deputado Tertuliano Milton Brandão, Teresina, Piauí.



Source: research collection (2012).

2.3 INTERVENTION PROCEDURES AND RESEARCH DATA COLLECTION

The pedagogical intervention was conducted in four sequential stages: 1) an expository-dialogic lecture; 2) administration of a semi-structured pre-intervention questionnaire; 3) implementation of the educational board game; and 4) administration of a post-intervention questionnaire to evaluate the methodology.

Initially, an approximately 50-minute expository-dialogic lecture addressed environmental impacts in the Parnaíba River basin and contextualized the topics represented in the board game. Next, the first semi-structured pre-intervention questionnaire was administered to assess students' prior knowledge and perceptions of the severity of environmental impacts. The 30 students were then divided into 10 groups of three participants to play the game. Each round lasted approximately 20 minutes. After the first round, the students spontaneously requested another, and two consecutive rounds were therefore completed. The final stage of data collection consisted of the post-intervention questionnaire

and methodological evaluation, which assessed students' perceptions of whether the game facilitated learning and their acceptance of the playful activity. The dataset generated from the two questionnaires and the two game rounds was reported in the original study as having been collected in approximately 30 minutes, in addition to the time allocated to the lecture.

Photographic records were produced during the intervention, and the responses were analyzed after the activity. The use of photographs of the students in this chapter was authorized. In the original study, the research was characterized as qualitative, supported by a literature review and an account of the experience conducted with the participants.

Figure 2 – Students during the pedagogical intervention with the game “Rio Abaixo, Rio Arriba” at Unidade Escolar Deputado Tertuliano Milton Brandão, Teresina, Piauí.



Source: research collection (2012).

2.4 DATA COLLECTION INSTRUMENTS AND DATA ORGANIZATION

In July 2012, two semi-structured questionnaires consisting of open- and closed-ended questions were developed. The first instrument assessed aspects related to students' perceptions of the environmental impacts addressed during the lecture. Students evaluated floodplain cultivation, riparian forest removal, washing cars with soap on riverbanks, waste disposal, dredging, predatory fishing, erosion and siltation, and recycling. They were also asked which problems associated with the Parnaíba River had most caught their attention.

The second questionnaire addressed the participants' experience with the game and their perceptions of using such activities in the classroom. The instrument included questions about feelings associated with participating in games, perceptions of classes using differentiated activities, ease of learning, and evaluation of the game. Responses to the closed-ended questions were summarized descriptively as absolute and percentage frequencies, whereas the open-ended responses were used to complement the interpretation of participants' perceptions.

Data obtained from the questionnaires administered to the students were tabulated and analyzed using descriptive statistics (absolute and percentage frequencies) and qualitative analysis of the participants' justifications.

3 RESULTS AND DISCUSSION

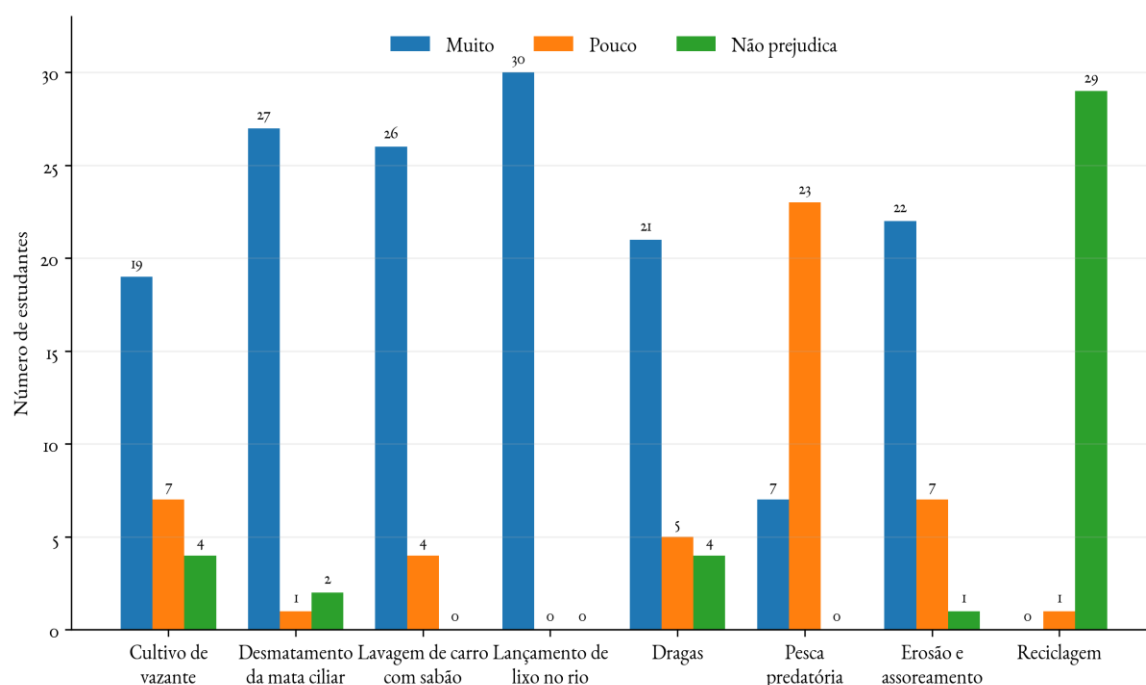
3.1 STUDENTS' PERCEPTIONS OF ENVIRONMENTAL IMPACTS ON THE PARNAÍBA RIVER

During the lecture, students were observed to have prior knowledge of recycling and proper waste disposal, which facilitated dialogue and the contextualization of the board-game topics during the activity. The content presented was intended to complement the information incorporated into the board and to contextualize the situations subsequently encountered during the game.

When asked about the extent to which specific human activities harmed the environment, waste disposal into the river received a unanimous response, being classified as highly harmful by 100% ($n=30$) of the students. Riparian forest removal was considered highly harmful by 27 students (90%), slightly harmful by one (3.3%), and not harmful by two (6.7%). Washing vehicles with soap along the riverbanks received 26 responses in the highly harmful category (86.7%) and four in the slightly harmful category (13.3%). Erosion and siltation were considered highly harmful by 22 students (73.3%), slightly harmful by seven, and not harmful

by one. Dredging was considered highly harmful by 21 students (70.0%), slightly harmful by five, and not harmful by four. Floodplain cultivation was considered highly harmful by 19 students (63.3%), slightly harmful by seven (23.3%), and not harmful by four (13.3%). Predatory fishing showed a different response pattern: seven students (23.3%) classified it as highly harmful and 23 (76.7%) as slightly harmful. Recycling, a positive practice, was correctly identified as not harmful by 29 students (96.7%), whereas only one student classified it as slightly harmful.

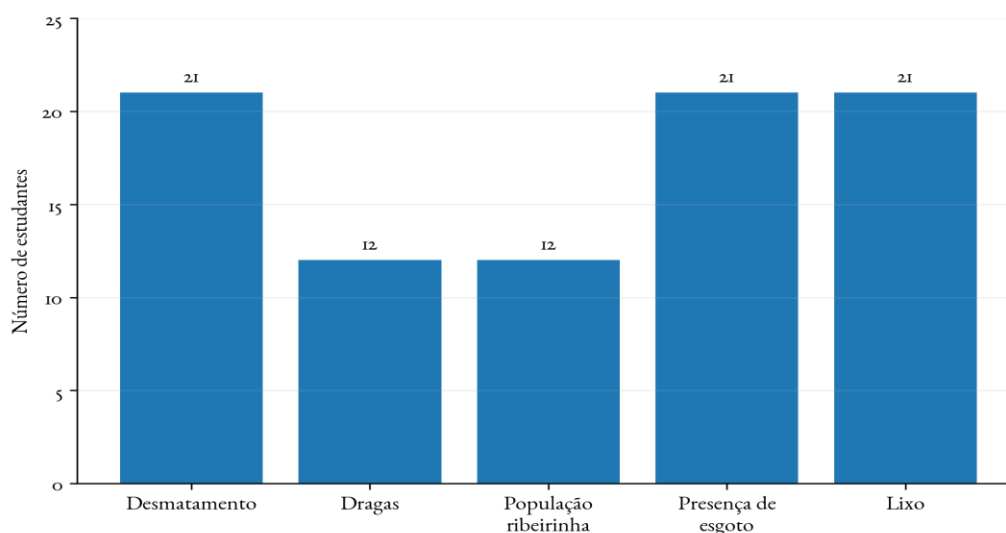
Figure 3 – Percentage distribution of students' responses (n=30) regarding the activities presented as harmful to the environment.



Source: prepared by the authors based on research data (2012).

When specifically asked which problems affecting the Parnaíba River had most attracted their attention, riparian forest removal, sewage discharge, and the presence of waste stood out, with 21 responses each (70%); these were followed by dredging and issues affecting riverine populations, with 12 responses each (40%) (Figure 4).

Figure 4 – Frequency of students’ responses regarding environmental problems affecting the Parnaíba River, Teresina, Piauí.



Source: prepared by the authors based on research data (2012).

The emphasis placed on waste, sewage, and deforestation demonstrates the participants’ attention to situations directly associated with the landscape and with human activities discussed during the intervention. Using the Parnaíba River as a reference made it possible to link environmental content to a regional geographic feature, thereby bringing Environmental Education closer to the students’ context. This approach is consistent with the understanding that Environmental Education should integrate knowledge and participation rather than being limited to the transmission of information (GUERRA; ABÍLIO, 2006; BARCELOS, 2008).

These findings indicate that students associate environmental degradation with visible disturbances in their urban surroundings and the riverine landscape. Their strong awareness of waste, sewage, and riparian forest removal is consistent with the findings of Santos et al. (2021) in a study using the game *De Olho no Velho Chico* in the Lower São Francisco region, and with those of Silva et al. (2024) involving students in Amapá. In both studies, proximity to local rivers led students to readily identify sewage and waste as direct threats to water quality and the health of riverine populations. Territorial contextualization through a regional river, such as the Parnaíba or São Francisco, can serve as a framework for scientific literacy by moving beyond decontextualized teaching and connecting science to students’ everyday realities (SANTOS et al., 2021).

On the other hand, a clear atypical pattern was observed in students’ perceptions of predatory fishing: 23 students (76.7%) classified it as slightly harmful, whereas only seven

(23.3%) considered it highly harmful. This pattern contrasts with other studies in the literature. In the game De Olho no Velho Chico, failure to comply with the closed fishing season, the capture of threatened species (such as the pirá, *Conorhynchos conirostris*), and the capture of juvenile specimens are penalized by moving backward on the board and are understood by students as serious threats to ichthyofauna conservation (SANTOS et al., 2021).

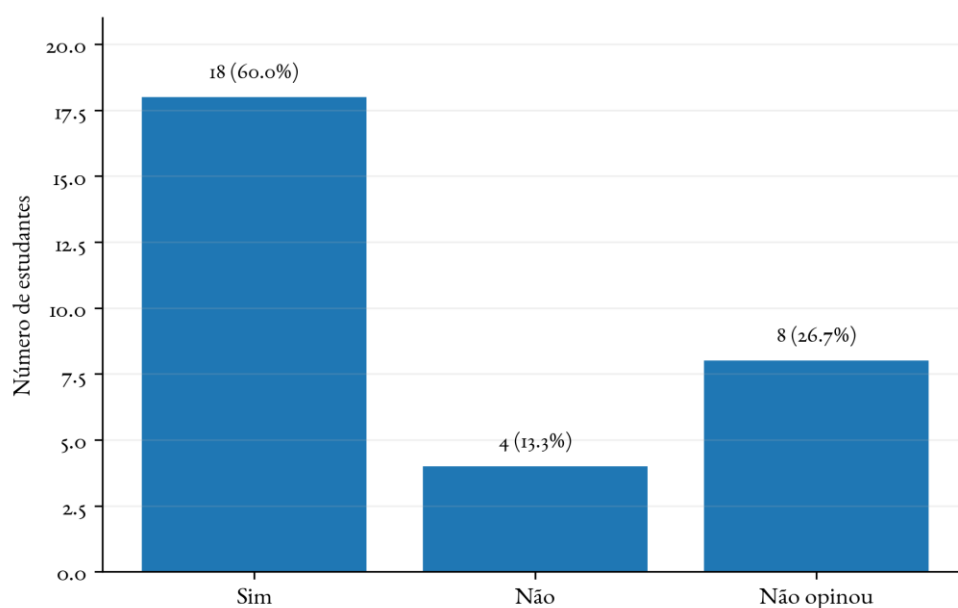
This divergence suggests that when a particular environmental impact is less visible in the everyday life of urban students, or when fishing is viewed solely as a subsistence or recreational activity, the severity of the problem may be underestimated. This highlights the need for educational games not merely to mention the issue, but to incorporate explicit penalty mechanisms and targeted pedagogical mediation (*debriefing*) aimed at challenging simplistic views of fishery-resource exploitation (SANTOS et al., 2021; MARTINS; BRANDO, 2023).

3.2 STUDENTS' PERCEPTIONS OF THE EDUCATIONAL GAME AND PLAY-BASED LEARNING

When evaluating the use of the Rio Abaixo, Rio Arriba game and whether it facilitated learning, the response frequencies were as follows: 18 students (60%) stated that the activity facilitated content learning, four (13.3%) responded negatively, and eight (26.7%) expressed no opinion (Figure 5).

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Figure 5 – Percentage distribution of students' perceptions of the contribution of the educational board game to learning (n=30).

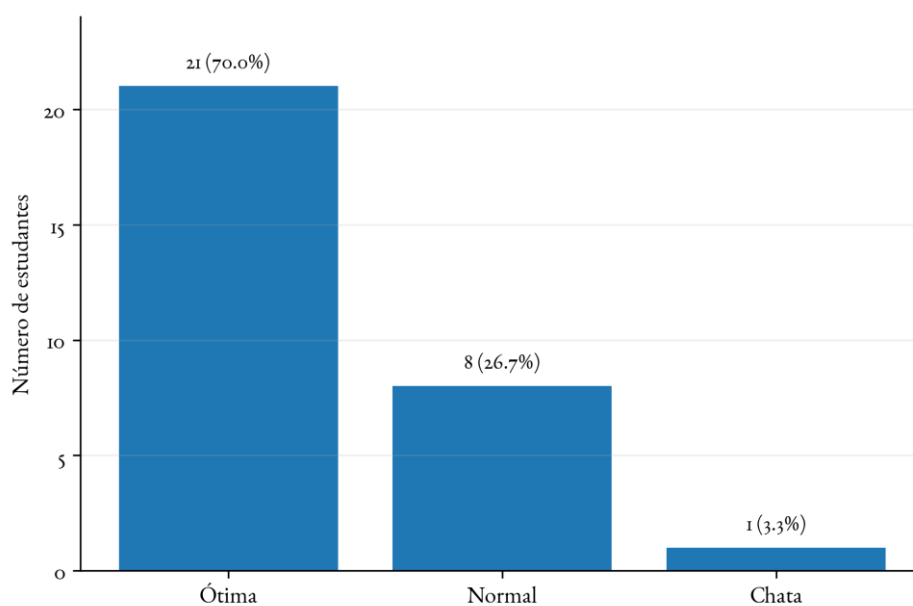


Source: prepared by the authors based on research data (2012).

The predominance of favorable responses is consistent with the receptiveness observed during the activity, when the participants requested an additional round. This result should be interpreted as the students' own perception of the teaching resource rather than as an isolated experimental measure of academic performance.

The overall evaluation of the methodology also indicated acceptance of the activity. Twenty-one students (70%) rated it as excellent, eight (26.7%) as average, and only one (3.3%) as boring. Thus, 29 students (96.7%) evaluated the activity as excellent or average. Their enthusiasm was also evident in the spontaneous request for a second round of the game and in statements that it is “better to learn while playing.”

Figure 6 – Students' evaluation of the pedagogical methodology based on the use of the educational game “Rio Abaixo, Rio Arriba”.



Source: prepared by the authors based on research data (2012).

This response is consistent with the proposal to integrate the playful dimension into school content without reducing the game to mere entertainment. Kishimoto (1994) argues that playful situations can bring students closer to the cultural content addressed in school, while Ronca (1989) relates play to knowledge construction. The high level of acceptance and the perceived cognitive gains are consistent with several studies using board and digital educational games focused on biodiversity and water-resource conservation (DIAS et al., 2021; BUENO et al., 2024; PINTO et al., 2025; GONÇALVES et al., 2025). Dias et al. (2021), when applying a

roulette game about Tumucumaque Mountains National Park (Amapá), recorded 100% (n=32) student approval regarding the use of games in Biology classes and found that knowledge of native species increased from 39% in the pre-test to 100% across seven biological categories after the play-based intervention.

Similarly, Bueno et al. (2024) found that the FaunAtlântica game, focused on the Atlantic Forest and the coast of Paraná, enabled 65.6% of students to become familiar with ecosystems they had not previously known, such as estuaries, while 52.5% deepened their knowledge of regional species; 89% considered the rules easy to understand. In the context of water resources and national parks, Gonçalves et al. (2025) reported that the Aventuras no Peruaçu game achieved 80% approval for its visual design and 70.8% clarity regarding the objectives related to waste collection and wildfire prevention. Therefore, the 60% rate of perceived learning facilitation obtained with Rio Abaixo, Rio Arriba falls within the range reported in the literature for regionally contextualized board games used in Elementary School (DIAS et al., 2021; BUENO et al., 2024; PINTO et al., 2025).

Within a single activity, the game made it possible to address topics such as riparian forests, erosion, siltation, solid waste, water pollution, fishing, and water use, linking this information to locations associated with the Parnaíba River. The board structure, which incorporated explanations, penalties, and rewards, allowed concepts to be revisited throughout the course of play. This organization is consistent with the use of interdisciplinary approaches in Environmental Education (LEFF, 2006; PHILIPPI JR.; ROMERO; BRUNA, 2004).

The findings, however, refer to an experience conducted with a single class of 30 students and primarily represent the responses and perceptions obtained after the activity. Accordingly, they allow the receptiveness of the game and the content identified by the participants to be assessed within the investigated context, but they do not support generalization to other student populations.

3.3 IMPORTANCE OF EDUCATIONAL GAMES FOR ENVIRONMENTAL EDUCATION AND BIODIVERSITY CONSERVATION

The results obtained with the “Rio Abaixo, Rio Arriba” game reinforce the relevance of playful strategies in school-based Environmental Education, as 60.0% of participants stated that the game facilitated learning and 70.0% rated the methodology as excellent. These data do not,

by themselves, demonstrate long-term behavioral changes, but they indicate good receptiveness and engagement with the content addressed.

This interpretation is consistent with experiences conducted in public schools in Piauí, where games focused on Caatinga fauna produced favorable results regarding suitability, attractiveness, and the learning of new concepts, while also bringing Science content closer to regional biodiversity (FERREIRA et al., 2022). Territorial contextualization is relevant because students may have limited knowledge of local and threatened species, reinforcing the need for educational programs connected to their own environment (GAVRILAKIS; STAMOULI; LIARAKOU, 2023). Recent studies in Brazil also recommend building on prior knowledge and using playful and active practices to strengthen connections with local biodiversity and conservation values (SANTOS et al., 2026).

In this sense, the game extends beyond a recreational function by representing municipalities, riparian forests, erosion, siltation, waste, water pollution, fishing, and other elements associated with the Parnaíba River. The combination of rules, images, and environmental consequences transforms a regional socioecological system into an object of learning and promotes the integration of scientific knowledge, local reality, and reflection on conservation. Its educational potential, however, depends on articulation with clear pedagogical objectives and sustained Environmental Education actions.

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3.4 RELATIONSHIP TO THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

The proposal can also be discussed in the context of the 2030 Agenda. Its most direct relationship is with Sustainable Development Goal 4 (SDG 4 – Quality Education), particularly Target 4.7, which focuses on ensuring that learners acquire the knowledge and skills needed to promote sustainable development. Socio-environmental education associated with the 2030 Agenda requires methodologies that connect environmental problems, civic competencies, and ecosocial transformation across local and global scales (MORALES HERNÁNDEZ; CAURÍN ALONSO; LACRUZ PÉREZ, 2023).

By contextualizing learning through situations associated with the Parnaíba River, the game also relates to SDG 6 (Clean Water and Sanitation) by addressing sewage, waste, and water quality; SDG 12 (Responsible Consumption and Production) through its treatment of waste disposal and recycling; and SDG 15 (Life on Land) by incorporating riparian forests,

wildfires, erosion, habitats, and fauna. The emphasis students placed on waste, sewage, and riparian forest removal shows that content associated with these goals was recognized during the intervention.

Implementation of the SDGs becomes meaningful when global targets are translated into local actions involving Environmental Education, responsible water use, appropriate waste disposal, vegetation restoration, and protection of biological diversity (PERETTI; BERNARDY; MACHADO, 2024). Thus, the game does not constitute evidence that the 2030 Agenda targets have been achieved; rather, it represents an educational practice aligned with its principles by bringing students closer to concrete environmental problems affecting a river that is central to the regional landscape and identity.

4 FINAL CONSIDERATIONS

The development and implementation of the “Rio Abaixo, Rio Arriba” board game demonstrated the feasibility and favorable receptiveness of playful educational methodologies for Environmental Education among sixth-grade Elementary School students. By adopting the Parnaíba River basin as the territorial framework, the intervention achieved its objective of bringing school-based scientific knowledge closer to students’ socio-environmental experiences, thereby promoting the contextualization of biological content and scientific literacy.

Analysis of students’ perceptions revealed marked sensitivity to environmental impacts that were visually prominent in the urban and riverine landscape, particularly solid-waste pollution (waste disposal), effluent discharge (sewage), and riparian forest degradation. Conversely, the atypical classification of predatory fishing as a lower-severity impact revealed a perceptual gap that underscores the pedagogical relevance of the playful resource: the game and its dynamics can serve not only to diagnose simplistic perceptions but also to provide conceptual foundations that require moments of teacher-mediated discussion (*debriefing*) and targeted reflective mechanisms.

From a pedagogical perspective, the tool proved capable of combining entertainment, social interaction, and reinforcement of essential ecological concepts through its dynamics. The experience indicates that educational games can serve as teaching resources for Environmental Education when linked to clearly defined objectives and situations that are close to students’ everyday realities. In the present case, using the Parnaíba River as a contextual reference made

it possible to integrate regional environmental elements into Science teaching by connecting information about the river, human activities, and environmental consequences.

Although the findings are restricted to the specific context of the class investigated (n=30) in Teresina, Piauí, they provide concrete evidence that bioregional contextualization through educational games is a promising strategy for formal education. Future studies should evaluate the “Rio Abaixo, Rio Arriba” game at other educational levels and in different municipalities throughout the Parnaíba River basin, as well as investigate the long-term effects of the resource on changes in students’ conservation attitudes and its contribution to continuing education for Science teachers as a strategy to support Environmental Education activities in school settings.

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