

# **ENVIRONMENTAL EDUCATION: THE 3R's (THREE R'S) IN THE FIRST YEAR OF FUNDAMENTAL EDUCATION**

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## **Abstract**

*We can observe that, at present, the social body suffers from the dilemma of the excess of the inadequate corollary creation of solid waste. This excessive amount of waste has been worrisome because, if not properly collected and disposed of, it causes serious consequences to health and the environment. Thus, the reluctance of the non-management of solid waste is numerous and includes environmental, economic, social, and health aspects. In this scenario, it is clear that waste cannot be completely eliminated; however, it is possible to decrease it by reducing the amount of waste and recycling as much as possible. It is true that the contemporary world is characterized by an almost constant state of crisis, however, to recycle or reuse has the sense to restrain what is used, to limit waste and residues, to protect the environment, to conserve and defend the ecosystem. For this, there is a need to moderate this expressed consumption, not only to use what is necessary, but also to reuse what is possible. The optics of the "3R's" concept aims to contain the ecosystemic shock with applicability to the development of new products. In this sense, it is essential to emphasize education, as an agent of change, for the development of people into informed and active citizens. In view of the above, the objective of this work was to observe, the perception of children in the first year of elementary school about the environment to, subsequently, make them aware in a critical and reflective way of how we relate to each other and how we can improve our environment through the reduction and reuse of waste. The concept of the three Rs in this case study was used,*

*therefore, to clarify and promote reflection regarding excessive shopping, the reuse of what would go to waste such as cans, cardboard, bottles among others, and finally, to offer the possibility of converting items no longer used into other creations. This study contributed to the awareness and preservation of the environment and its didactic-pedagogical sequence promoted progression in the visuomotor, motor, motor, playful, affective, and critical-reflexive aspects, for the promotion of the acquisition and strengthening of competencies and skills.*

**Keywords:** *Elementary school, Environmental Education, Environment, 3R's.*

## **INTRODUCTION**

Sustainable development is not a principle or a political-financial activity, but the foresight of thought-action that values today so that future generations can enjoy the benefits of scientific, technological, social, and environmental progress. In these loci, there are conquests of general benefits where industry, the economy, citizens, commerce, the environment, and the planet are embraced. Therefore, it is essential to focus on education as an agent of change for the social, economic, financial, business, and professional organizations in the national territory. This allows us to develop people into informed and active citizens, since education is fundamental to rebuilding the dignity, rights, and duties of citizens.

The concept of the three Rs in this case study was used, therefore, to clarify and reflect on the unnecessary purchases, the reuse of what would go to waste such as cans, cardboard, bottles among others and, finally, to offer the possibility of converting items no longer used into other creations.

The importance of this work for the school context and the social body was presented in the promotion of didactic-pedagogical resources and classes directed towards sustainable development, through environmental education, aiming to adopt attitudes whose principles were linked to environmental protection, in order to create a conscious and knowledgeable society of sustainable viabilities where the three Rs, in this context, represented educational actions to combat exacerbated consumption, waste and reflection about the production, generation and incorrect disposal of waste in the environment. This served to better understand the consequences of this problematic and the applicability of reduction, reuse, and recycling through the action of the three R's.

The 20th century can be considered a watershed, when technology and consumption were put in check to the detriment of natural resources, since the rudimentary and artisanal style of production was totally modified by the advent of the industrial revolution. Over the past 150 years a linear production system has been developed, where resources are taken from nature for the production of consumer items, with their disposal at the end of the process. (AZEVEDO, 2020).

Given this, there was a concern with the dissemination of the importance of environmental protection and zeal through reduction, reuse and recycling (3R's). According to "GADOTTI (2010), environmental protection stems from the understanding of the environment, and the logic of an ecosystemic understanding depends on education. The school, as is known to most, is the ideal place for such propagation, since it is an official ground for stimulation, massification of knowledge, and teaching-learning. Thus, the "3R's"

refer to the possibility that can and must live in the school reality, through integrated, continuous and permanent practices for the transversality of environmental education, because according to "MORIN (2003), the relationship between human beings and nature cannot be seen in a reductive or isolated way".

The present work was based on the clarification of knowledge about the possibilities of reduction, reuse, recycling and awareness of waste reduction, waste and pollution caused to the environment, with activities directed to the reality of environmental education, stimulating students to participation, autonomy, critical thinking and development of concepts, habits and routines of the three eras.

As a result of the above, it was verified that the protection of the environment and the reduction of pollution must be the common cause of the populations for the good of all. In this vein it was found the search for answers to environmental difficulties in various social sectors that seek, according to "ARAÚJO E MAGALHÃES (2010), correct their environmental errors," with the development and expansion of habits and attitudinal concepts that give due value to the sustainable use of resources that, in turn, are natural, but are not renewable or infinite

## **BIBLIOGRAPHIC REVIEW**

### **2.1 Solid Waste: Definition And Characterization**

As defined in Federal Law 12.305/2010 of the National Policy for Solid Waste (PNRS) in Article 3, item XVI,

*"Solid Waste: material substance, object or discarded good, resulting from human activities in society, whose final destination is proceeded, proposed to proceed or is obliged to proceed, in solid or semi-solid states, as well as gases contained in containers and liquids, whose peculiarities make it unfeasible to discharge them into the public sewage system or bodies of water, or require solutions that are technically or economically unfeasible in view of the best technology available. (BRASIL, 2010).*

Regarding solid waste, according to the Agência Nacional de Vigilância Sanitária (2006), the following clarification can be found

General waste: called "household waste" and generated as a result of domestic activities;

Construction waste: arising from construction, renovation and demolition;

Port and airport waste: generated by individuals and waste from transportation services;

Mining waste: such as mineral waste, non-mineral waste, sludge, tailings.

The gathering of these classes and their respective groups of waste in Brazil are established by the then NBR - ABNT, which pays attention to the possible risks of waste to nature, its environmental, biological, physical and chemical conditions, and its threats to human health. The specification and ordering of waste recognize the processes and activities that generate it, defines its components and characteristics and compares these components with a list of waste and substances known to affect human health and the environment (GUERRERO; MAAS; HOGGLAND, 2013).

JACOBI AND BENSON (2011), state that environmental problems and damage caused by poor waste management are exacerbated by the lack of knowledge, awareness and appropriate waste management tools. In terms of internal waste management, it is recommended that measures be taken to reduce their generation, in accordance with the priorities of the National Solid Waste Policy, in addition to sorting, information,

continuous environmental education and cooperation with local recycling associations (BRASIL, 2010). Therefore, the Environmental Education adopted, in conjunction with solid waste management (SWM), should aim to change attitudes, but this requires a continuous action and not just punctual aiming to ensure awareness and sensitization in order to create a culture of responsibility for waste and promote the guarantee of a quality environment (BETANIM AND SILVA, 2016).

Citizens who understand waste management are expected to better understand the links between consumption, waste generation, waste management and environmental and social impacts, and to be aware of their role in the social control of public services (PICCOLI et al, 2017; DINIZ AND ABREU, 2018)

## 2.2 Solid Waste X Environment

In Brazil, according to the Brazilian Association of Public Cleaning and Waste Companies (ABRELPE), per capita solid waste generation is estimated at 1.035 kg per capita, per day (ABRELPE, 2017, p. 15). Therefore, it is important that municipalities adopt public policies to diagnose and implement the collection, transportation, and final disposal of solid waste in an environmentally sound manner. In addition, the society itself needs to be aware of the importance of the solid waste issue, since the collection of recyclables can bring benefits and reduce the environmental impact (RIBEIRO et al., 2014).

In Brazil, the generation of municipal solid waste increased by about 1% between 2017 and 2018, reaching 216,629 tons per day. During this period, the population also increased (0.40%), leading to a slight increase in per capita growth (0.39%). This means that, on average, each Brazilian produces a little over 1 kg of waste per day (Panorama of Solid Waste in Brazil 2018/2019 ABRELPE).

The volume of waste in Brazil continues to grow, reaching 1.52 million tons per week (Figure 1), corresponding to approximately seven cruise ships. These figures are presented in the Panorama of Solid Waste in Brazil 2020, performed by the Brazilian Association of Public Cleaning and Waste Companies.

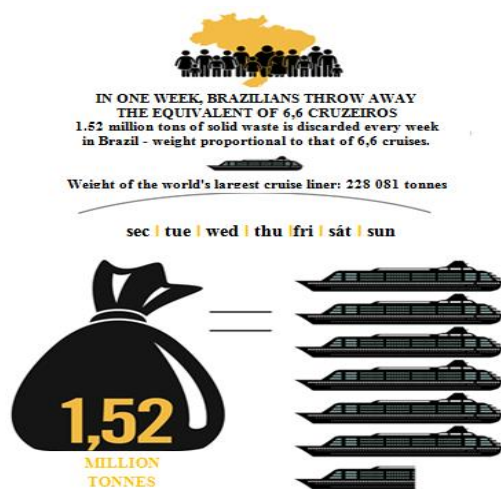


Figure 1: Garbage Disposal by Brazilians.  
Source: ABRELPE / IBGE, (2020).

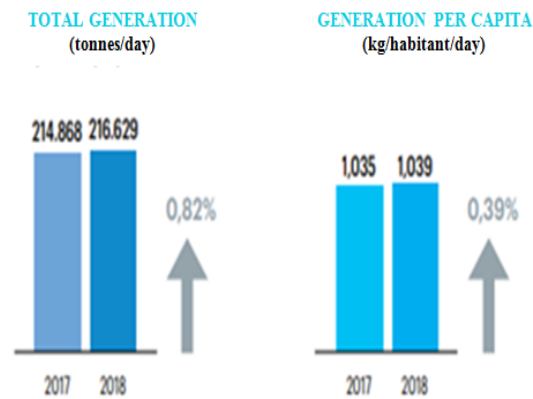


Figure 2: Urban Solid Waste Generation in Brazil.

Source: ABRELPE/IBGE, (2018/2019).

According to (Figure 2), "Between 2017 and 2018, MSW generation in Brazil increased by almost 1% and reached 216,629 tons per day. As the population also grew in the period (0.40%), the per capita generation had a slightly lower increase (39%). This means that, on average, each Brazilian generated a little more than 1 kilo of waste per day". (Panorama of Solid Waste in Brazil 2018/2019 ABRELPE p. 12). According to the data survey conducted by Abrelpe: Between 2010 and 2019, MSW generation in Brazil recorded a considerable increase from 67 million to 79 million tons per year. In turn, per capita generation increased from 348 kg/year to 379 kg/year. The amount of waste collected grew in all regions of the country and, in a decade, went from about 59 million tons in 2010 to 72.7 million tons and, in the same period, the collection coverage went from 88% to 92%. In 2010, 3,152 municipalities registered some initiative of selective collection, while in the following decade this number increased to 4,070 municipalities. It is important to highlight, however, that in many municipalities the selective collection activities still do not cover the entire urban area (Panorama of Solid Waste in Brazil 2020 ABRELPE pg. 14 - 19).

In the meantime, in the effectiveness of the National Policy on Solid Waste (Law 12.305/2010), reverse logistics was established as one of the instruments for implementing the principle of shared responsibility for the life cycle of products (ABRELPE, 2020).

In view of the above, VILHENA (2018) stresses the importance of Environmental Education, student awareness and continuing education for civil servants in the development of municipal waste management strategies and the promotion of waste picker cooperatives for waste treatment. According to BEZERRA et al. (2014), environmental awareness refers to the awareness of environmental issues. In other words, people are aware of their environment and, therefore, are able to care for and protect it. COELHO et al. (2018) explain that, when given the opportunity, schools are places where people learn to understand the relationship between human activities and environmental problems. Moreover, it is verified that of the 79 million tons of waste generated in 2019, 72.7 was collected and 40% of this waste was disposed of inappropriately, such as in controlled landfills or dumps (Figure 3). The proper disposal, of solid waste is in landfills that prevent contaminated wastewater from reaching the groundwater (Panorama of Solid Waste in Brazil 2018/2019 ABRELPE).

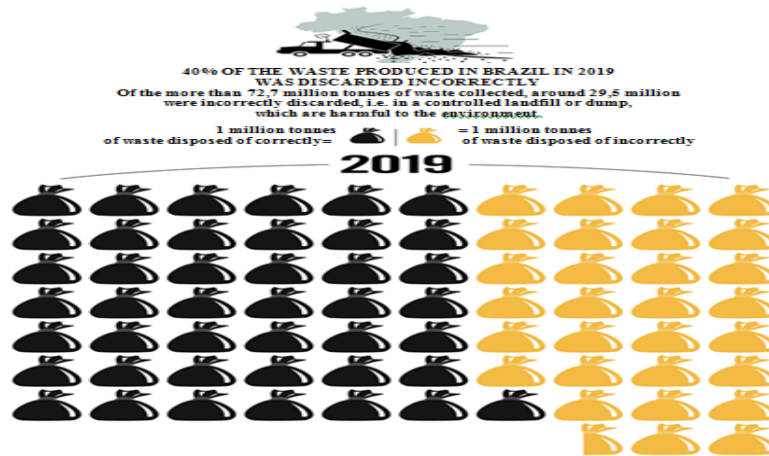


Figure 3: Disposal of waste produced in Brazil, in 2019.  
Source: ABRELPE (2020).

Northern Brazil produced 16,073 tons of solid waste, daily, in 2018 (Figure 4), of which 81.31% was collected. Of the total waste collected by the 450 municipalities in the region, more than 4,000 tons arrived in dumpsites daily, the highest percentage in the region (35%). The municipalities in the North spent on average: R\$8.16 per month in cleaning services, per person in garbage collection, costing approximately R\$2 billion annually and creating more than 24,000 jobs (Panorama of Solid Waste in Brazil 2018/2019 ABRELPE).

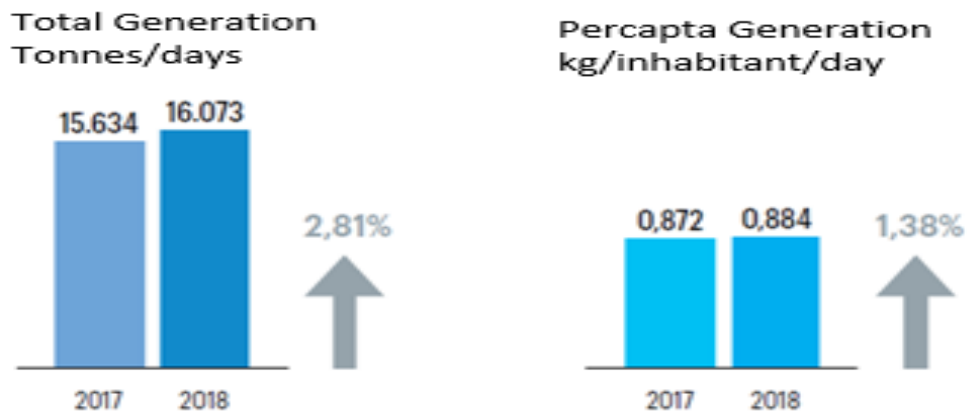


Figure 4: Generation of Municipal Solid Waste (MSW) in the North Region.  
Source: ABRELPE/IBGE, (2018/2019).

“The North, the region with the lowest population density in Brazil, generated 16,073 tons of urban solid waste per day in 2018, of which 81.31% was collected (Figure 4). Of the total collected in the 450 municipalities in the region, more than 4,000 tons per day ended up in dumps: a percentage of 35% - the highest rate among all regions" (Panorama of Solid Waste in Brazil 2018/019 ABRELPE p.20). From this angle the goals of Agenda 2030, for example, are clearly focused on sustainable development with economic, social and environmental benefits, as they combine the three dimensions of sustainable development. The 2030 Agenda sets out seventeen sustainable development goals (Figure 5): poverty



eradication; zero hunger and sustainable agriculture; health and well-being; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation and infrastructure; reducing inequalities; sustainable cities and communities; responsible consumption and production; action against global climate change; life on water; life on land; peace, justice and effective institutions; partnerships and means of implementation (AGENDA 2030).



Figure 5: Sustainable Development Goals.

Source: AGENDA (2030).

Therefore, it is understandable that in developed countries, increased environmental awareness has led to the promotion of recycling programs that encourage reuse rather than landfill.

According to OLIVEIRA et al (2014, p.250), "social responsibility has become increasingly present in the management of organizations due to the pressure from stakeholders for companies to accept and mitigate the impacts caused by their activities." Companies and institutions need to actively participate in the debate on social and environmental responsibility, linking them to their own areas of activity and highlighting the benefits achieved (OLIVEIRA et al., 2014). In terms of waste disposal, most of the waste generated by society is disposed of inappropriately. There are several reasons for this, but the main reason is that most people, both in households and in industries, are not aware of the risks of improper disposal of products and materials (MIGUEL AND CRUZ, 2020). As the impact on the environment is visible in many areas, educational activities in the classroom are very important and can significantly contribute to social change (SILVA, LIMA E COSTA, 2020).

In this reality, environmental management systems (EMS) are implemented in organizations and can be defined as part of a management system that includes the structure, responsibilities, practices, procedures, processes, and resources of the organization to implement, develop, review, and maintain the company's environmental policy. This approach and solution is important because it can demonstrate that a given company is operating according to environmental management standards that aim for the sustainable use of natural resources, renewable or otherwise (ALCÂNTARA et al., 2012).

### 2.3 Solid Waste Management and Management

According to the United Nations Organization - UN (2017), Latin American countries generate 540,000 tons of municipal solid waste, 30% of which is disposed of incorrectly. This number is expected to reach 671,000,000 tons per day by 2050. Far from this reality, Brazil is the third largest generator of waste in Latin America, with only 3% of it being recycled, although 31% of it could be recycled if it were classified as such (Figure 6): Glass (2.4%), Plastic (13.5%), Paper and Cardboard (13.1%) and Metals (2.9%) (SEBRAE, 2017).

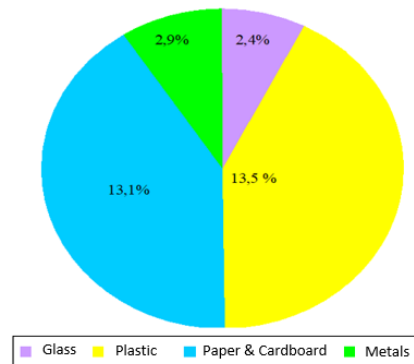


Figure 6: Sustainable Development Goals.

Source: Authors, (2021).

In 1981, Brazil adopted the National Environmental Policy (PNMA) through Law 6938 (1981), which began to regulate the use of the country's environmental resources. The law was the result of a worldwide movement to adopt a national environmental policy that planned, managed, and controlled the use of natural resources (SANTIAGO, 2012). In 2016, the National Sanitation Information System (SNIS) surveyed 3,670 Brazilian municipalities and found that, of these (Figure 7), 59.0% of the solid waste generated was deposited in landfills, 9.6% in controlled landfills, 10, 3% in dumps, 3, 4% in sorting and composting facilities, and 17.7% were found without information, corresponding mainly to municipalities with populations below 30. 000, suggesting that 3/4 of the "uninformed masses" are directed to dumpsites (BRASIL, 2018).



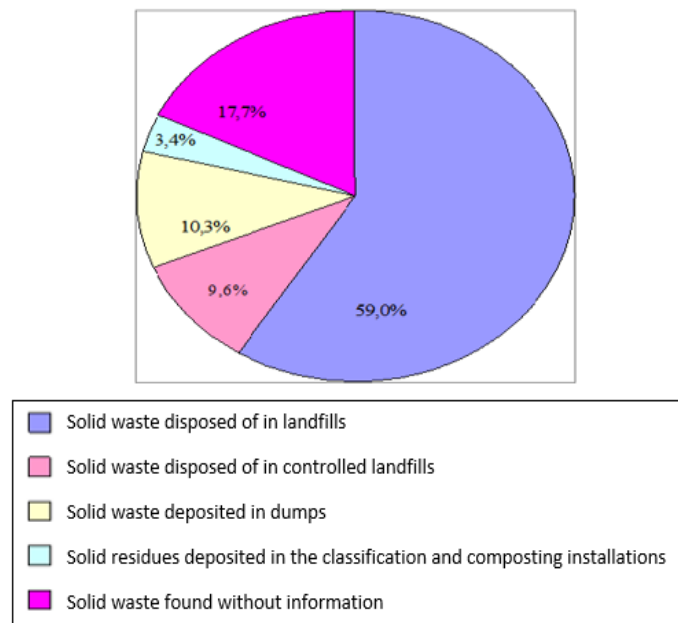


Figure 7: National Sanitation Information System (SNIS), 2016.

Source: Authors, (2021).

URBAN (2016) notes that in Brazil, small cities that face financial difficulties have the biggest problems with proper waste management. As an alternative, the author suggests the creation of a common landfill, managed by a consortium of municipalities, to reduce costs. According to MANNARINO et al. (2016), the definition of a final waste disposal site needs to take into account different criteria for the protection of the natural and urban environment, taking into account aspects such as hydrology, the area occupied by the waste, the degradation of the surrounding environment, and the timing of reuse.

Waste management is one of the most important public health barriers to prevent the spread of disease (ISWA, 2020). Solid waste management surrounds caring for and respecting others. Action should focus on empathizing with each other's situations, and a more sensitive and humane approach is needed to ensure that hazardous and accidental waste, such as mechanical pencils, are managed properly without putting waste pickers at risk (CAVALCANTE et al, 2019). In the meantime, waste management contemplates the entire regulation of the legislation for the integrated waste management, which refers to all activities of solid waste management, including the collection, the adjustment process, the disposal and its ultimate accommodation (SCHALCH; CÓRDOBA, 2011). The National Solid Waste Management Policy Law establishes this solid waste management and its criteria as integrated waste management. Thus, it is important to define and adopt parameters to optimize, strengthen, execute and apply policies defined in the integrated waste management plan, to monitor and manage solid waste management services for, sequentially, to deliberate about, in a sustainable and collaborative way, considering the reflection of socioeconomic and political-environmental aspects (BRASIL, 2010). Environmental issues have been debated for a long time. This is because it is through environmental issues that we can raise awareness, maintain a balance in the environment, better understand how the environment works, and formulate the idea that it is possible to live in harmony with the environment without destroying it (SILVA, 2013).

## **2.4 Environmental Education**

The first Cycle of Basic Education and interdisciplinary methods are used more than in other cycles (OLIVEIRA, 2019). The reason for this statement is that, the first cycle of education occurs in a single teacher system, where the teacher has to allocate his time according to his own pedagogical practices. In later cycles, this task is complicated by pluralism, which requires greater personal and professional commitment from the teacher (COSTA, 2019).

Interdisciplinarity is an articulation of knowledge that prioritizes the personal development of the student. Incorporating environmental issues into people's daily lives allows them to see the relationship between people, society and nature from a new perspective, to reflect on their values and attitudes towards coexistence, and to solve environmental problems together. Therefore, public measures should be taken to strengthen educational institutions, especially elementary school, which are essential for the social, cultural and moral development of the population (ABÍLIO et al., 2011).

It is relevant to emphasize that we live in a modern world that is undergoing profound social, political, economic and environmental changes. Therefore, it is necessary to promote new precepts of environmental protection and sustainable development that respect nature and society in order to improve the well-being of future generations (SOUZA et al., 2011). Environmental Education was introduced in Brazilian schools between 1970 and 1980, when natural science was introduced to develop biophysical concepts and geography to discuss the interrelationship between humans and nature. It was also suggested that a specific subject be created to deal with environmental issues. However, this was rejected as contrary to the multidisciplinary, interdisciplinary and transdisciplinary principles of Environmental Education (VALDANHA NETO; KAWASAKI, 2013).

According to PIRES (2012), Environmental Education was considered a secondary issue until the 1990s, when it was introduced after international pressure during the military dictatorship. Since then, due to the mobilization triggered by the Rio-92 conference and the global impact of environmental issues, the Federal Government has prepared and developed important documents and policies on the subject. Environmental Education gained legitimacy through Law # 6938/81 of the National Environmental Policy (PNMA) in its Art. 2 Section X "environmental education at all levels of education, including community education, aiming to enable it to participate actively in defense of the environment" (BRASIL, 1981).

The development of Environmental Education was included in the 1988 Brazilian Federal Constitution (CF), in Article 225. Chapter I discusses the environmental education legislation and Chapter II discusses the national environmental education policy. Chapter I states that environmental education, both formal and informal, is the process by which individuals and communities develop social values, knowledge, skills, attitudes, and competencies to protect the environment, which is considered to be of common interest to all. Therefore, it should be considered a basic requirement for a healthy quality of life and sustainable development in all areas of life (BRASIL, 1999). Furthermore, Law 9.795 defines the role, rights, duties, principles, and objectives of environmental education.

In terms of content, it emphasizes that environmental education cannot be included in the curriculum as a separate subject. Therefore, it must be included in the curricula of public and private educational institutions, including primary, secondary, vocational and technical education; it must be included in the content of subjects in all different areas of knowledge; it must be developed as a coherent and continuous educational

practice and, above all, it must be integrated into the daily lives of the participants in the educational process (BRASIL, 1999).

## **2.5 Three R's Policy**

The policy of the three Rs - 3R's is regulated in Law No. 12.305/2010, the Institution of the National Policy for Solid Waste. The reality of this conception and legal basis is the reduction in the consumption of natural resources and the postponement of waste disposal as the last step towards the sustainable management of solid waste. According to Article 3, Section XIV, Chapter II, Title I of the above-mentioned law, recycling refers to the process that aims at reducing the amount of waste generated. It is the transformation of the physical, physical-chemical or biological properties of solid waste into raw materials or new products. In this sense, the conditions and criteria established by the competent authorities of the National Sanitary Surveillance System and the Unified Agricultural Health Care System are framed. Title I, Chapter 2, Art. 3, item XVIII, defines reuse as a process by which solid waste is used without biological, physical, or chemical treatment, under conditions and criteria established by the competent authorities of the National Environmental System - SISNAMA and, when applicable, of the National Sanitary Surveillance System - SNVS and the Unified Agricultural Health Care System - SUASA. The reduction is framed in Title I, Chapter II, Art. 3, Item XIII as sustainable patterns of production and consumption: production and consumption of goods and services in a way that meets the needs of the current generations and allows for better living conditions, without compromising environmental quality and meeting the needs of future generations. Over the centuries, societies have followed a growth pattern centered on economic development. Such a pattern has awakened a behavior as if the resources were inexhaustible and the earth could absorb an infinite amount of waste (SANTOS, CÂNDIDO, 2013).

The "three Rs" policy comprises a series of actions adopted at the 1992 Earth Summit in Rio de Janeiro and in the fifth European Environment and Development Plan in 1993. This policy is grounded in and applies to all types of waste, solid, liquid and gaseous emissions. (QUINTELA, 2015, p. 191). In accordance with the National Waste Management Plan (2011, 2012), the elucidation of the contents, methods and tools of environmental and waste education requires an educational policy that emphasizes the concept of "3R's". The concept of "3R's" is a key element of the Waste Management Plan and other programs, projects and policies, especially waste reduction and the promotion of clarification of environmental, economic and social issues in the right way. The expansion of waste reduction policies and the assessment of the "3R's" are concepts of Agenda 21 (BRASIL, 2000) and Article 19, Item X of the PNRS establishes the following priorities:

- a) Waste reduction: based on the idea that waste, especially excessive waste, is a key component of inefficiency in today's consumer society. This concept includes both behavioral changes and new business models, such as ecodesign and investment in eco-efficiency projects (BRASIL, 2011).
- b) Reuse: Medium and long term actions that extend the useful life of materials and products or reduce their expected consumption. It is important to broaden the meaning of this term, as it is often confusing and limited to small-scale activities that reuse materials to produce low value-added consumer goods or goods with no economic or environmental value. It is widely used as a means to address the serious problem of overproduction and improper disposal of waste and has become an important element of

environmental education in schools and communities (BRASIL, 2011).

- c) Recycle: evaluate the classification of materials and the appropriate management of wet and dry waste, according to the guidelines of the National Solid Waste Policy, promote selective collection projects and reduce the amount of disposed waste (BRASIL, 2011).

Prior to the care of proper waste disposal, every effort should be made to reduce the harmful effects of inappropriate final disposal or to achieve the desired reuse through reuse, recycling, composting, or energy recovery, i.e., measures aimed at not generating waste (GODECKE, et al 2012).

## **2.5 Environmental Education in The Context Of Elementary School**

"Having its origin in the environmental movement, Environmental Education (EE) initially sought to involve citizens in correct environmental actions, aiming at the conservation of nature. Currently, it is already considered the need to include other aspects, prioritizing the development of critical thinking of the learner, stimulating a more balanced view of man, not only on the natural environment, but also in its social trajectory, and cultural and ethical training" (ALCANTARA, 2012, p. 49). According to BURSTYN (2013), the 1990s marked a milestone: Rio 92, a conference on environmental education held in Rio de Janeiro. Chapter 36 of Agenda 21: a document presented at the Rio 92 conference is dedicated to education and emphasizes the importance of ethical and environmental awareness for sustainable development. The Rio+20 conference reaffirmed the importance of good relations between nature and people, including through environmental education projects. The 1988 Federal Constitution clearly states that "environmental education should be promoted at all educational levels to increase public awareness for the protection of the environment. According to RHODEN et al. (2018), environmental awareness contributes to the community being able to collectively shape these policies in the design and implementation of waste management.

According to the ratification of STANGHERLINE SPECHT (2014), "environmental issues are interdisciplinary and cut across multiple fields of knowledge, so they can be placed in the context of any discipline."

Schools must create a learning environment that encourages dialogue among students about social, political, and environmental issues in their daily lives. For students to express their knowledge, it is crucial that teachers act as knowledge intermediaries, focusing on students' experiences and using group discussions to open up ideas for discussion (COSTA, 2019). In the classroom, therefore, teachers need to help create meaningful learning situations that address students' concerns and give children a voice in learning activities (LOPES, 2014).

As the primary goal of schools is to teach students to 'read the world' (FREIRE AND MACEDO, 2011), to make a difference they need to develop students' Statistical Literacy - the ability to 'read, interpret and critically evaluate information. (PERIN & WODEWOTZKI, 2019, p. 1)

## **MATERIALS AND METHODS**

The activities (Chart 1), and evaluations (Chart 2), were carried out in the 1st Year of Elementary School in an urban Municipal School in the South Zone of Manaus for students from six to seven years old. The

target participants were the teacher "M" and her students.

Table 1: Didactic Sequence of the Activities Carried Out.

<b>Activities</b>	<b>Intended Objectives</b>
Data Collection	Transversal activities
Elaboration of Activities	Educational practice in the experience of environmental education.
Conversation Rounds	Promotion of democracy, citizenship and critical thinking.
Lectures and Musicalization	Teaching and learning through music.
Educational Videos	Awareness of the problem of waste and the importance of the practice of the three Rs.
Group activity	Spreading causes, problems and mitigations of urban solid waste (USW).
Individual activity based on exercises	Interdisciplinary exercises in the context of Environmental Education with the principle and applicability of the 3R's and the garbage problem.
Digital games - Gamification	Knowledge and dynamism in the didactic-pedagogical sequence of the Environmental Education classes about the 3R's and the garbage theme.
Video Production	Experience and visualize the separation of solid waste to enhance creativity.

Source: Authors, (2021).

Table 2: Evaluation Methodology.

<b>Avaliative Methodology</b>			
<b>Type</b>	<b>Purpose</b>	<b>Applicability</b>	<b>Period</b>
Diagnostic	Detect	Review the conditions for new learning.	The beginning of the school year or semester.
Formative	Regulate	Identify specific learning difficulties and determine their causes.	At the introduction of a new chapter or new content.
Somatic	Categorize	Ensure that goals are obtained. Provide knowledge, concepts, notions to improve teaching and learning.	In the entire course of the teaching period.

Source: Authors, (2021).

### 3.1 Materials

For the present prelude is considered, therefore, relevant and was used the selected reading of works, books, laws, projects and magazines, which contain content directed and articulated to environmental issues, involving solid waste and the Three "Errors" - 3R's in the context of Environmental Education, so that there was the previous preparation of materials and projection of engaging lessons, which promote the autonomy

of students as protagonists of the learning process, in an active and productive practice.

Therefore, after the definition of solid waste, the selective collection was carried out, followed by the observation in locu of the production of daily household waste such as, for example, the types of garbage produced in the kitchen and in the bathrooms of the students' homes, the decomposition time, pollution, separate collection, and composting. The "Three Errors Workshop" was based on the reuse, reuse and reuse of solid waste that would otherwise be thrown away, and which proved to be useful and useful for making games and toys, such as pencil cases, boxes, safes and dolls, in order to highlight the relevance of the 3R's principle, reveal its environmental and social benefits and put into practice environmental education, recycling what was previously considered waste or useless.

### 3.2 Methods

These activities (Chart 3) are in line with the National Curriculum Guidelines for Environmental Education (DCNEA), which state that the improvement of environmental education in schools can increase the level of awareness, thus leveraging knowledge, including scientific knowledge, to sensitize the student's environmental perspective and thus contribute to a different view of what is exposed by common sense about the main causes of diseases throughout life, risks to human health and the environment.

Table 3: Didactic Sequence - Frequency.

<b>Environmental Education Didactic Sequence - Frequency</b>				
<b>Activities</b>		<b>Total number of students participating</b>	<b>Present</b>	<b>%</b>
1	Data collection	49	40	68,60
2	Elaboration of activities	49	43	70,07
3	Conversation rounds	49	38	67,62
4	Lectures and musicalization	49	39	68,11
5	Educational videos	49	42	69,58
6	Group activity	49	40	68,60
7	Individual activity based on exercises	49	49	100
8	Digital games - gamification	49	38	67,62
9	Video production	49	24	60,76

Source: Authors, (2021).

These methodologies were incorporated and practiced through interactive activities, with the use of physical materials, engagement in cyberspace, manipulation of applications, photographic records, making environmental puzzle, environmental trivia game, memory game of selective collection, recycled dominoes and ecosystemic alphabet, in view of the participation of the family, i.e., the participation of parents and guardians, because, in this environment the family is thought as a partner of the school and considers what is provided in the federal constitution in its Art. 205 "Education, a right of all and duty of the State and the family, will be promoted and encouraged with the collaboration of society, aiming at the full development of the person and his preparation for the exercise of citizenship".



### **3.2.1 Data Collection**

This case study occurred within the educational field and sought to dialogue with the reality of the problematic environment, the generation of solid waste, its causes, effects and possible mitigations, with the application of the three Rs, dissemination of awareness and reflection on such human practices in the midst of exacerbated consumption, waste generation and changes in the natural and urban environment. The planning stages were then outlined so that there could be the understanding and dissemination of knowledge with the integration of the tripod: environment, solid waste, and the three R's contextualized and applicable to this action research. In this sense, it was important to remember that for the execution of this study we considered the context and the reality of the social distance that the schools were facing with the imposition of covid-19, that said, we clarify that the school year began on February 18, 2021 remotely with activities, interventions and communication by video conferences, video calls and interactive virtual activities, through the use of applications, tablets, computers and cell phones. Subsequently, the classes took on a new format, because on May 31 the semi-attendance teaching began (hybrid) and finally on August 23 the teaching became 100% attendance and the same was in force until the end of the school year (December 17, 2021).

The proposed activities in Environmental Education, in this phase of work, aimed at the development, stimulation and encouragement of changes in behavior, with respect to attitudes that promote awareness of sustainability, linked to the theoretical and practical field, through audio visual activity and the making of posters by the students of the 1st year of elementary school. In this phase of the work, the activities were aligned with the content of recycling and, in this direction, the making of posters met the optics of recycling and segmentation of solid waste generated in the students' kitchen, as a responsible and environmentally conscious action. As most people know, the understanding gained in the field of Environmental Education is present in school curricula in order to leverage group and public cultural transformation. This is done to propitiate collective conversion, based on sustainable lifestyles, in order to achieve the effectiveness of attitudinal practices, environmentally correct.

Through these locus, an active research was carried out characterized by the effective interaction between the researcher and the researched public. The problematic of this study also intended to contextualize the current reality, its situations, obstacles, and possible mitigations. In this sense, this case study is not just a mere activism, but a study that seeks to involve the participants in the activities, through the dissemination of knowledge with green practices, to deliberate, favor, and benefit the research subjects and the environment to which they are inserted, thus amplifying the level of awareness, knowledge, and information between the researcher and the researched. In addition, it was considered what is planned, through the adoption occurred in 2017 by the National Common Curricular Base - BNCC, a policy that organically organizes the basic knowledge, which provides that education should be taught to all students, in all grades of elementary school, thus beginning to consider the prism of the environment, in view of the principles of sustainability and the common good, with the growing interest in environmental issues as they relate to educational practice. In this sense, the class was encouraged to be more participatory in public problems that impact the environment around them, thus transmitting a transdisciplinary education. Consequently, there was a consensus of practices and dialogues for the children to understand the importance of Environmental Education at school and for them to fully realize their potential as citizens.

Thus, it was necessary to encourage them, in the conversation circles and in the other activities of the stages of this study, with dialogues about their observations, perceptions and instigations. In this sense, there was the need to encourage their participation in the activities as a practice of teaching and learning, the school-family partnership, present from beginning to end, so that there could be a participatory, emancipatory, critical education and the implementation of citizenship in the sharing and socialization of knowledge and the clarification that it is from little that one learns. In this reality, the teacher needed to be grounded with the practice of planning, researching, collaborating, and sharing her findings in a critical-reflective way.

### **3.2.2 Developing activities**

For the given pandemic and post-pandemic moment of the current school year (2021) and atypical, activities were considered that contemplated the context of the first and second semester of the municipal education network, which was given by remote teaching, later, by the reality of semi-presencial teaching followed by presential teaching, after the second dose of the vaccine of their teachers. Due to this, the selected resources were: physical materials, remote activities, virtual meeting, which contemplated the sending and feedbacks of activities to promote the alignment of the development of the activities, such as, creation-interaction in digital games and making of teaching materials, from available physical materials, to meet the introduction, deepening and consolidation of knowledge. This article included the workshop with the application of the three Rs, discussing themes with videos, songs, readings, images, materials that can be reused in everyday life, and gamification, thus developing a practical plan for teaching and knowledge in the school space, considering the three atypical moments experienced by education: remote, hybrid, and face-to-face. This material of environmental, interdisciplinary and didactic-pedagogical nature was made available through guidelines, for the direction of collective activities, individual exercises and practical activities that were worked through corrections and feedback in cyberspace and at school, with the students of the first year of elementary school in the afternoon shift, aiming at stimulation, interaction, autonomy, discovery, acquisition of knowledge and promotion of empathy in the field of the problematic researched in this work.

### **3.2.3 Conversation rods**

The teaching in the conversation circle was applied, in a contextual and relevant way to daily practice, and not mechanical or redundant (Figure 8). In the experience of the conversation wheels, in cyberspace and in classroom classes, as shown in Figure 6: Conversation Wheel where the students of the first year of elementary school had the opportunity to learn with the visions of the context of their reality and, in this sense, the knowledge was formed in situations of the dialogue forum, in view of the observation of the multiple realities of the context of the students. In the remote, semi-attendance, and face-to-face teaching scenario, the tools used were Google Meet, WhatsApp, YouTube, video classes, activities from the Home Classroom Project, activities in pdf, Word, suggestive handouts, and printed activities to reach collectivity. In this context, it was considered fundamental to organize the planned activities, based on evidence, to promote and encourage the use of knowledge and methods in teaching and learning. The curriculum theme chosen also focused on human behavior as a model to reduce waste and production.



Figure 8: Conversation circle with students.

Source: Authors, (2021).

### 3.2.4 Lectures and Musicalization

The complementation with the use of lectures and musical activities provided knowledge, clarifications, and experiences that helped to decipher the principles of the three Rs, the consolidation of knowledge about reuse, care, and preservation through expository lessons with the use of data show, notebook, sound box, pendrive, whiteboard, notebooks, gouache paint, colored glue, brushes, authorial drawings, literacy activities adapted with the use of plastic, cut-and-paste, educational games, music, gestures, and movements to educate and fix the knowledge transmitted. The lectures took place in the classroom context, so that there was a collective reach of the class (Figure 9). And the inclusion of musicalization happened in two moments: in the WhatsApp group, by directing the music videos, and in the classroom. In this follow-up, the objective was the contribution of revealing teaching, which helped to achieve the attitudinal conceptions that are linked to aesthetics, maintenance, preservation, and care for the environment in which one lives. Music stimulates creativity and enhances an individual's cognitive, physical, and motor development processes. It also allows individuals to interact more effectively with others and with the world and promotes interpersonal relationships (PINTO, 2013). In this palpable experience, (Figure 8: Musicalization), music was recognized and used as a manifestation of human appreciation (Figure 8). Therefore, this work articulated the assessment of music education, art and motor skills to improve cross-curricular education, taking into account the applicability of this understanding to the link with the ecosystem and the environment as a way to learn to concern the preservation and ecological awareness of the environment.



Figure 9: Lecture in the Classroom.  
Source: Authors, (2021).



Figure 10: Classroom Musicalization Activity.  
Source: Authors, (2021).

### 3.2.5 Educational videos

In parallel, there was the introduction of educational videos, making of handicrafts, to stimulate discussions about the problems that garbage represents for people and the environment (Figures 11 to 16). These activities were applied gradually, always with the support of an educational video and the support and guidance of the teacher.



Figure 11



Figure 12



Figure 13



Figure 14



Figure 15



Figure 16

Figure 13: Handwork with Drawing and Painting.

Figure 14: Handwork of Finger Painting and Brush Painting.

Figure 15: Making and displaying an informative poster in the classroom about the 3R's;

Figure 16: Interdisciplinary group activity in the context of Environmental Education.



Source: Authors, (2021).

### 3.2.6 Group Activities

The students were divided into small groups, which focused on Environmental Education with emphasis on conscious consumption, solid waste, selective collection, recycling in the preservation of the environment and the 3R's (Figures 17 to 19).



Figure 17



Figure 18



Figure 19

Figure 17: Group activity on Environmental Awareness and Preservation.

Figure 18: Group Activity about the 3R's.

Figure 19: Group Activity with the 3R's Theme.

Source: Authors, (2021).

At this stage, after the first meeting, each group received Christine Coirault's Little Book of the Environment (Figure 20).

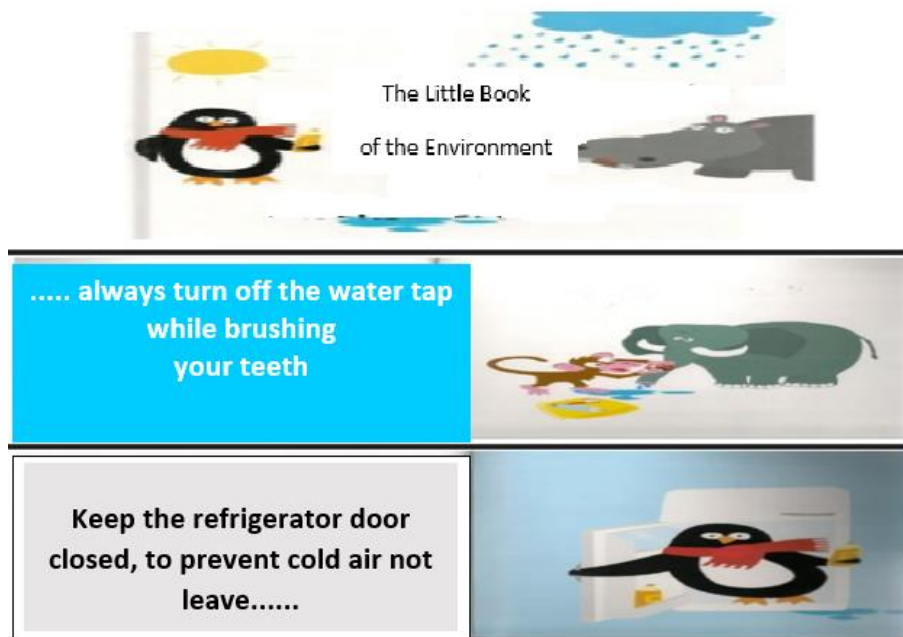


Figure 20: Little Book of the Environment, by Cristine Coirault (2009).  
Source: Authors, (2021).

Then, a video clip was shown and, finally, participation and commitment were evaluated, with feedback and appreciation of the correction of the activities. The students received an encouraging message, with educational stamps or virtual stickers, to encourage them to study (Figures 21 to 25).



Figure 21



Figure 22

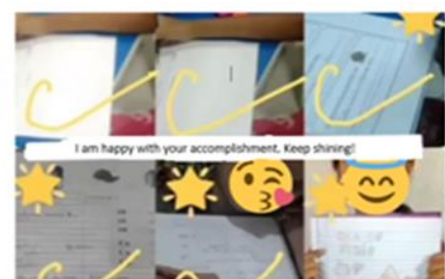


Figure 23

Figure 21: Activity Feedback, with Incentive Message and Virtual Figure.

Figure 22: Remote Correction with Motivational Message.

Figure 23: Correction and Viewing of Activities.

Source: Authors, (2021).





Figure 24

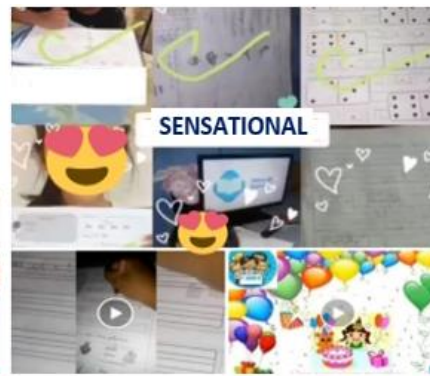


Figure 25

Figure 24: Encouraging Message to the Student.

Figure 25: Correction and Congratulations to the Birthdays of the Month.

Source: Authors, (2021).

### 3.2.7 Individual exercise-based activities

After developing and working the theme with concepts and attitudes, exercises were directed regarding what was contextualized in the day's lesson. The individual activities focused on individual procedural knowledge and the teaching-learning process to develop sensitivity, skills, and attributions of knowledge to transform attitudinal behavior and thinking about the tangible lucidity of the environment in which one lives (Figure 26). The individual activities developed contemplated the interdisciplinary exercises, which explored the concepts of: solid waste, selective collection, "Three Errors", environment, health, pollution, recycling, sustainability, ecology, social responsibility, solid waste management, landfill, and conservation (Figure 27).



Figure 26



Figure 27

Figure 26: Individual Student Activities.

Figure 27: Exercise Correction.

Source: Authors, (2021).

### 3.2.8 Digital Games

According to FARIAS & MARACAJÁ (2012), an alternative for the effectiveness of Environmental Education in the community is the development of actions in schools. For this experience of Environmental Education: The 3R's in the First Year of Elementary School had as interactive activity four gamification games: maze, memory game, word search and find the combination in the virtual environment, containing the sentences: right or wrong (Figures 28 to 33).



Figure 28



Figure 29

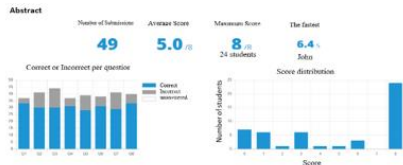


Figure 30

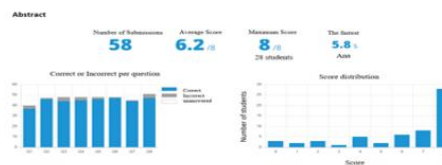


Figure 31



Figure 32



Figure 33

Figure 28 (A and B): Access Link to the Digital Games in the Class WhatsApp Group.

Figure 29: Deadline for Accessing the Gamification Activities.

Figure 30: Gamification - Find the Combination.

Figure 31: Gamification - Environment Word Search.

Figure 32: Gamification - Environmental Maze.

Figure 33: Memory Game of Selective Collection.

Source: Authors, (2021).

The games were created by the regular teacher as a way to promote diversified activity with the use of technology. The support tool used was Wordwall, which is a platform designed to create personalized activities, in a gamified model, using only a few words. After the end of the evaluation each student received a symbolic award, strings made with string and rubberized, similar to a badge, and were given play dough as an incentive to participate in the activities (Figures 34 to 38).



Figure 34



Figure 35

Figure 34: Awards for Completion of Gamification Games, with Badges and Balloons.

Figure 35: Awarding to Students for the Completion of Gamification Activities.

Source: Authors, (2021).



Figure 36



Figure 37

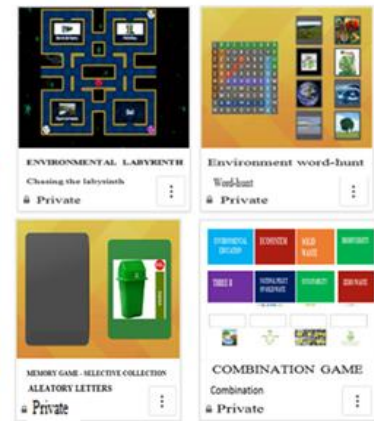


Figure 38

Figure 36: Gamification Awards and Congratulation Message to Students.

Figure 37: Badge making for the Gamification award.

Figure 38: Creation of Games. - 4 Games: Word Search, Maze, Memory Game, Find the Combination.

Source: Authors, (2021).

### 3.2.9 Video Production

According to the National Curricular Parameters of the Environment, environmental issues should be worked on starting in Basic Education:

[...] the main function of the work with the theme Environment is to contribute to the formation of conscious citizens, able to decide and act in the socio-environmental reality in a way committed to life, with the welfare of each one and the local and global society. For this it is necessary that, more than information and concepts, the school proposes to work with attitudes, with the formation of values, with the teaching and learning of skills and procedures (BRASIL, 1997, p. 25). For this purpose, activities were developed with the garbage from the students' kitchen and bathroom, taking into consideration the aspect that we produce garbage daily. (Figures 39 to 47). In this experience the student should make the separation of garbage, considering the practice of selective collection as a pedagogical practice. In this sense, the students were asked to separate, in bags or boxes, what is paper, aluminum, plastic, glass, and organic material. Parallel to this, there were printed and colored activities contemplating the colors and symbols of selective collection. After that, it was observed, in locu, what could be transformed into fertilizer or be reused or sent to the selective collection stations in the urban area of Manaus. With these considerations, each student, in their respective homes, made the production of a video about solid waste, focusing on the separation of these materials that were subsequently reused, reused, recycled in the reuse of a new function proposed in the making of educational games and the "3R's practical workshop".





Figure 39



Figure 40



Figure 41



Figure 42



Figure 43



Figure 44



Figure 45



Figure 46

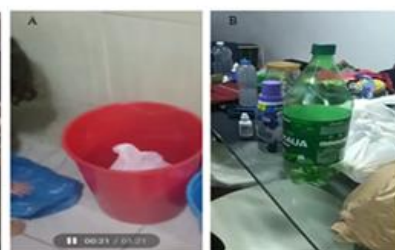


Figure 47

- Figure 39: Separation of Solid Waste in the Student's Residence Kitchen.
- Figure 40: Separation of Solid Waste in the Student's Residence Bathroom.
- Figure 41: Separation of the Solid Waste in the on-site Practice at the Student's Residence.
- Figure 42: Video production of the on-site practice of the Separation of Solid Waste.
- Figure 43: Filming of the Separation of Solid Waste.
- Figure 44 (A and B): Filming Separating the Waste.
- Figure 45: Video of Sorting the Waste generated in the student's kitchen and bathroom.
- Figure 46 (A and B): Separating the Waste.
- Figure 47 (A and B): Separation of the Waste at the Students' Residence.

Source: Authors, (2021).

### 3.2.10 Making games / printed activities

The ease and efficiency of learning through games are not related to age, but games should be well planned, because they are elements of everyday life that can involve participants in the educational process (GUIMARÃES et al. 2017). In view of this, the involvement of students and their respective parents/guardians was requested in the experience of the educational games, which were made with recycled material such as cardboard, caps, and pet bottles. Parallel to this, there was the printing of interdisciplinary activities to work on the environment in the disciplines of: science, art, Portuguese language, mathematics and history (Figures 48 to 57).



Figure 48: Game Time.

Figure 49 (A and B): Putting the Puzzle together.

Figure 50: Figure 50: Correcting the Printed Activities.

Figure 51: Selective Waste Collection Activity.

Figure 52: Ludic and Pedagogical Games.

Figure 53: Tic Tac Toe with recycled material.

Figure 54: Plasticizing the Puzzle.

Figure 55: Playing the Tic Tac Toe.

Figure 56: Tournament of the Tic Tac Toe.

Figure 57: Delivery of Ludic and Pedagogical Games.

Source: Authors, (2021).

The environmental debate at school was important due to the environmental deterioration requiring attitudinal transmutation. Therefore, it was observed that in order to achieve this goal, in the remote school reality, it was necessary to focus on Education as a tool for social modification, to amplify moral principles beyond consumerism. It is known that consumerism, the generation of solid residue, and waste, affect the collectivity. Therefore, there was a need to insert the content of selective collection of solid waste in Environmental Education to subsidize the stimulus to promote awareness and apprehension that citizens are an integral part of this environment.

The offer of activities related to the selective collection aimed at the transformation regarding environmental awareness, by directing activities performed in the school WhatsApp group, with the forwarding of educational video, musical and written activities, in the curricular components of Portuguese Language, Natural Sciences, Geography and Arts, specifically, with the forwarding of painting, cutting and pasting activities and, subsequently, the correction and devolution of the same in the WhatsApp group of the 1st year of elementary school and the correction in the classroom.

Thus, knowledge was conducted as a transversal and interdisciplinary educational opportunity. In this sense, the proposition of selective collection worked here was destined to the focus on recycling and the preview of reduction and reuse of solid waste, as a perspective of sustainability, to reflect and learn about the struggles and possibilities of minimizing the environmental impacts caused by solid waste and its polluting

actions. The activities to raise awareness about the importance of selective collection of solid waste are part of the important Environmental Education, which must be carried out regularly and continuously, according to the provisions of Law No. 9.795, of April 27, 1999, on Environmental Education. The core of this phase was to carry out activities to establish a dialogue among students of the 1st Year of Elementary School of an urban Municipal School in the South Zone of Manaus about the daily management of solid waste and its relation to the environment, in terms of solid waste.

### 3.2.11 Three R's Workshop

At this juncture, we observe the basic recommendations of the National Curriculum Guidelines for Environmental Education (DCNEA) assigned to Environmental Education, in accordance with Article 8 of Federal Law No. 4.281 of June 25, 2002, which governs the Federal Law No. 9.795/1.999, as to the possibility and guidance to recognize opportunities, challenges and disparity in the social and environmental field, to expand teaching-learning methods aligned to the multidisciplinary, interdisciplinary and transversal educational objectives.

From this angle, it was possible to verify the relevance of providing the exploration and use of active methodologies for the development of citizenship and environmental awareness, through active participation in the deliberation of care and zeal for the local, regional, and global environment. This phase was fulfilled with the applicability of the 3R's, with the making of objects, toys, and accessories, using solid waste, which previously, most likely, would have been thrown away because they were considered useless or because of the lack of dissemination of information and knowledge. In the Three Errors Workshop these items gained a new function and utility (Figures 58 to 62).



Figure 58



Figure 59



Figure 60



Figure 61



Figure 62



Figure 58 A e B: Brinquedo Reciclado - Foguete.

Figure 59: Exposição da Oficina dos 3R's.

Figure 60 A e B: Brinquedos com Materiais Reciclados.

Figure 61 (A e B): Brinquedos Reciclados: Bilboquê, Papai Noel e Cestinha.

Figura 62 (A e B): Brinquedos Reciclados - Casinha, Boneca.

Fonte: Autores, (2021).



### **3.2.12 Data Analysis**

The participants of this sample were the teacher and the students of the 1st Year of Elementary School in the afternoon shift of the 1st Year of Elementary School of an urban Municipal School, located in the South Zone of Manaus. In this phase of the work, it was conceived as relevant the results obtained by the planning and continuation of the didactic sequence unfolded with the class. This unfolding had as indispensable to the promotion of environmental awareness and the attitudinal behavior gained. This data analysis came to focus on the result of the knowledge acquired through participation, capacity to produce critical thinking and skills developed by conducting the educational resources used (through exercises, activities, oral presentations, educational videos, assistance to parents/guardians/students) in the construction of games, interactive activities, music and democratic dialogue held during the teaching of these actions and their respective stages of knowledge production.

We also reflected on meaningful teaching-learning for the students, that is, teaching that made sense and that was put into practice in their daily lives. In the same way, the feedback of the proposed activities was seen in terms of the teacher's role as a mediator of knowledge, without losing sight of the integrative methodologies that were present in this interaction, research, action, feedback, and correction. In this way, the student was valued and analyzed, as the central object of knowledge, capable of researching and interacting with dynamism and active participation in the activities of the remote educational environment, semi-attendance and attendance. For this, it was considered equally important, the involvement and participation of students and their respective families in the proposed activities about the conservation, preservation, awareness and sustainability of the Environment, in the approach and work of introduction, deepening and consolidation of knowledge about solid waste and the applicability of the Three R'S.

The aim of this parameter was to analyze the development of skills and competencies fostered from an environmentally and ecologically friendly perspective. At this juncture, possible changes in behavior were taken into account. And, thus, it was contemplated a meaningful teaching according to that described, explicit and ensured by the BNCC that invokes the interdisciplinary, transversal and integrated educational act, taking as appreciation for this analysis the students' prior knowledge and the breadth of knowledge that was obtained, without losing sight of the respective contextualization and significance of information and knowledge exposed and articulated during each pedagogical methodical phase of this case study. This data analysis also measured the knowledge obtained and the potentiality of the student's ability to expose and practice what was learned during and after the interdisciplinary activities included in the curricular components of the 1st year of elementary school. That is, what was contemplated within the activities directed towards the block of sustainability, selective collection, inclusion of the practice of the Three Errors, environmental impacts, concept of solid waste, the environment, reuse, reuse and recycling without disconnecting this knowledge from the disciplines engaged in the 1st year of elementary school.

## **RESULTS AND DISCUSSIONS**

### **4.1 Data Collections**

The data collection for this study was aligned with the focus of the activities that were undertaken on several occasions within the transversality of Environmental Education in the classes of a first year class

(Chart 4), of the Early Years of Primary School on the theme of Environmental Education: the 3R's (three Rs).

Table 4: Intended Goals & Achieved Goals.

<b>Intended Goals &amp; Achieved Goals</b>		
<b>Activities</b>	<b>Intended Objectives</b>	<b>Objectives</b>
Data Collection	Transversal activities	Execution of introductory concepts.
Preparation of Activities	Educational practice in the experience of environmental education.	Performance of activities integrated with the disciplines of the school curriculum in effect: Portuguese language, mathematics, history, science, art, geography, religious education.
Conversation Rounds	Promotion of democracy, citizenship and critical thinking.	Participation in the dialogue about the problematic of urban solid waste (USW).
Talks and Musicalization	Teaching and learning.	Happy environment, easy expression of emotions, promotion of a meaningful education.
Educational Videos	Raising awareness.	Facilitator of concepts and introductory questions.
Group activity	Spreading causes, problems, and mitigations of urban solid waste (USW).	Attitudinal change, collective engagement, participation.
Individual activity based on exercises	Interdisciplinary exercises	Acquisition of new knowledge and new perceptions.
Digital games - Gamification	Knowledge, dynamics	Competitiveness, participation, entertainment, learning
Video Production	Experience and visualize the separation of solid waste to sharpen creativity.	Practice in environmental education, exercise of citizenship, engagement family & school, promotion of knowledge.

Source: Authors, (2021).

The proposed activities considered the three atypical moments experienced during the 2021 school year due to the pandemic of the new coronavirus (covid-19). Therefore, it is important to inform that the activities included: remote teaching, semi-attendance teaching, and attendance teaching, with activities in cyberspace and didactic resources used in these three moments such as video uploads, photo uploads, Word documents, pdf, gamification, suggestive workbook printout, printed activity, mini workbook, textbook, calligraphy, activity notebook, drawing notebook, Internet, WhatsApp, Google Meet, data show, computer,

sound box, internet, cell phone, tablet, pendrive, cardboard, white glue, colored glue, glitter glue, scissors, cardboard, rubberized paper, craft paper, crayons, colored pencils, printer, eraser, atomic brush, black pencil, sharpener, ruler, string, cardboard, and solid waste as teaching and learning tools and as communication, socialization, and knowledge channels. This diagnosis was made through a democratic dialog where the welcoming, speaking, and listening of these students were prioritized (Figures 63 and 64). In this path of diagnosis we also used the mediation of technological resources for the reproduction of cartoons, short films, music and the movie "The Lorax - In Search of the Lost Suffrage", with the purpose of educating, sharing and learning.



Figure 63



Figure 64

Figure 63: Diagnosing with the Student.

Figure 64: Working with Concepts in the Classroom.

Source: Authors, (2021).

During the 'Diagnostic', students interacted through questions and answers, talking about where one lives, what one knows about this approach, what one had seen before this diagnostic journey, and what one saw for the first time at that moment, thus providing feedback on individual prior knowledge and information. The sound, visual, written, and oral explanation stimuli served as a "bridge/connection" that enabled the class to participate, inquire, question, and engage in this probing period. In this regard, some speeches were highlighted:

**Student D:**

*"Teacher, we live together in the environment."*

**Student J:**

*"Teacher, when I come to class it is very hot, there are few trees".*

**Student H:**

*"We have to take care of the planet, I will talk at home with my father and mother".*

**Pupil M:**

*"Garbage can become money, we can become rich".*

**Student C:**

*"Garbage turns into energy".*

**Student T:**

*"I don't know about the selective collection in my neighborhood, but now I know that we can recycle some things at home. I am going to make a pet cart with my dad".*

**Student C:**

*"It is necessary then hygiene, garbage brings disease right teacher?"*

**Student L:**

*"Each one doing his part then helps our planet".*

**Pupil V:**

*"The place for trash is in the garbage can, we have to have education".*

**Pupil G:**

*"I'm going to ask mommy to make a vegetable garden with pet bottle pots."*

**Student E:**

*"Is there clean energy and science, teacher?*

*Is there a landfill and a dump here?"*

**Student N:**

*"Besides having our home the Earth is everyone's home."*

**Student K:**

*"We are guardians of the Planet".*

**Student I:**

*"We can call the forest police".*

## **4.2 Activity Designs**

As can be seen, educational practices in Environmental Education enable an important change in actions, attitudinal habits and the development of a critical-reflective behavior. The implementation of differentiated activities in the school setting was, therefore, an important issue to carry out relevant dialogues about the awareness of the preservation of natural resources, the collective health of the environment in which we live, as well as the continuation of sustainable practices in our daily lives. According to the BNCC, Environmental Education is a current issue that needs to be addressed in an integrated manner in all areas of knowledge (BRASIL, 2019). Discussions on environmental education raise awareness about important issues in this area, such as solid waste, management, the management of these materials, environmental protection, the three wrongs, among other environmental problems.

Given these considerations, the development of these activities in Environmental Education is a dynamic process that aims to create values based on an emancipated education, which seeks to preserve citizenship by rethinking the use and production of disposable materials to make society ecologically sustainable (CAMARGO, 2012).

The previous elaborations of the activities were necessary to contemplate adequate materials, proportional to the 1st year of elementary school to engage adequate stimuli, necessary and desired reflections on the environmental issues that would be worked in this didactic experience, in a 1st year class of the Early Years of Basic Education, to address the pertinent problem of solid waste and the three wrongs, providing relevant and current information about the production of solid waste in Brazil and some individual and collective sustainable actions, through remote teaching, with virtual meetings, collective and individual activities, digital games and the development of teaching materials.

## **4.3 Chat Wheels**

During the conversation circles, slides with images and questions were shown to encourage participants to

think about waste and subsequently about the concept and effective practice of the 3R's. YouTube videos were also used to illustrate environmental issues related to waste and sustainable actions. The 'discussion circle' was designed to rethink attitudes towards the environment and raise awareness about product consumption, waste management, waste generation, the concept of waste, garbage, environment, and the 3R's. This methodology was an alternative to individual awareness raising activities. In this experience, the children learned the meanings of some words such as: solid waste, garbage, environment, ecosystem, and nature, and there was participation and interaction in the class. The children interacted among themselves and with the teacher talking about their reality, and pointed out observations in their homes and in the community. In view of the above, there was a positive result about the new knowledge acquired.

#### **4.4 Lectures and Musicalization**

The lectures and musical presentations were used in this methodological sequence as a way of teaching and learning, in order to offer differentiated and attractive classes.

The activities involving lecture and musicalization allowed the children of the 1st grade of elementary school to get to know better, in a fun and relaxed way, the environmental issues surrounding waste, its conceptualization and the three wrongs. It allowed their involvement with each other through music, gestures, and orality, thus developing the exchange of experiences in the socialization and sharing of knowledge in a playful and relaxed way. FERREIRA, PEREIRA, AND BORGES (2013), note that teachers of the early years must provide Environmental Education in the classroom. This is done in order to achieve a new way of thinking about the environment. The children engaged in this practice by dancing, singing, and clapping their hands. They were attentive to the musical transmission and "keeping an eye" on the images. There was a good acceptance, with the presence and participation of the students (Figures 65 and 66).

##### ***The 3R's Rule - Turma da Mônica***

*And so our story ended  
And I'm sure you enjoyed  
Learning that the world can be better  
You just have to know the rule of the three Rs by heart!  
The first R is reduce!  
The second R is reuse!  
The third R is recycle!  
And now let's go for the planet save!  
Get your class together and teach it right  
The rule of the three wrongs for the world to be clean  
And this is very good so that the worst doesn't happen  
This is the great plan to save our planet!  
Let's save it! (Let's save!)  
Let's save! (Let's save!)*

##### ***Children's Parody - Ó Lixo no Chão.***

*Mc Kevinho (Aquarela Kids).  
Zé the Frog has a tip  
He's an expert in taking care of the environment every day  
He's an expert  
Look what he does with the garbage, every day!  
Look what he does with the garbage, every day!  
Each garbage goes to a different place, pay attention.  
Plastic, glass, metal or cardboard.  
Oh, the garbage on the floor!  
You can't throw garbage there, that's rude.  
Be careful and pay attention.  
You have to take this garbage off the floor.  
Floor, floor, floor.  
Zé the Frog always recycles!*

Lá-la-la-la-la-la-la-la-la-la-la.

He is an expert.

Figure 65: Musicalização dos 3R's.

Figure 66: Musicalização - Ó Lixo no Chão.

Fonte: Autores, (2021).

Fonte: Autores, (2021).

### 4.5 Educational Videos

The objective of the educational videos was to raise awareness about the solid waste issue, the forms of disposal, and its collection. At this stage we worked on the concept of solid waste, the "3R's", and the National Solid Waste Policy. At this stage there were three moments: the first moment with the oral explanation, the second moment with the use of the educational video, and finally the authorial drawing based on the video watched (Figures 67 to 72)



Figure 67



Figure 68



Figure 69



Figure 70



Figure 71



Figure 72

Figure 67: Educational Videos in Environmental Education.

Figure 68: Preservation and Care for the Environment.

Figure 69: Educational Drawing.

Figure 70: Cross-Cutting Activity with Drawing in Environmental Education.

Figure 71: Cross-Cutting Activity and Drawing in Environmental Education.

Figure 72: Clean Environment Drawing.

Source: Authors, (2021).

The feedback was positive, because the students were able to understand, recognize, and express what they saw through their authorial drawings. It was an experience that allowed the expression of feelings, world reading, and expansion of vocabulary.

### 4.6 Group Activity

The group activity focused on solid waste, selective collection, and consumption in the context of urbanization. The group activity focused on the need to raise awareness and change values and attitudes so that students could integrate them into their daily lives (Figures 73 to 75). The activities were interdisciplinary, to achieve the proposed objectives of transversality, and the students were evaluated according to their engagement and participation in the activities. In this experience it was verified that the



children were able to socialize, were able to organize themselves to perform the activities, producing aligned and legible writing. Regarding the paintings, they were very colorful and progress was observed in the fine motor coordination of each of them.



Figure 73



Figure 74



Figure 75

Figure 73: Group Activity.

Figure 74: Groups in Action.

Figure 75: Group Interaction.

Source: Authors, (2021).

#### 4.7 Individual Exercise-Based Activities

In addition to providing the understanding of these themes, the intention was to propose, through the exercises, the questioning of similarities and differences between materials found in everyday objects that are discarded in the garbage garbage can. To promote dialogue about how they are discarded and how they can be used in a more conscious way. In addition, we aimed to associate the production of solid waste with the problems caused by excessive consumption and to make suggestions for conscious consumption, taking into account the growing habits of reducing, reusing, and recycling. Through the applicability of these activities, significant advances and gains were observed for the teaching and learning of the students. In this practice we obtained participation, class involvement, feedback from the activities, and corrections. The students' evolution was verified in the handwriting and cognitive aspects. The students were able to perform the proposed activities and were more familiar with the books, the notebooks, and asked for more activities like those that had been offered (Figures 76 and 77).



Figure 76: Interaction between the students in carrying out the activities.

Source: Authors, (2021).



Figure 77: Student Participation and Involvement.

Source: Authors, (2021).

#### **4.8 Digital Games**

The inclusion of digital games (environmental maze, word search, environmental matching, and selective waste collection memory game) favored playfulness as an educational practice and strengthened the competitive spirit of the class in a positive way. In general, boys and girls were motivated to carry out the gamification activity cycle, and there was family participation and encouragement for the students to complete their missions. At the end of each challenge, the students took a place in the game leaderboard (with position, name, time) of the Wordwall platform, as well as, scored and had the possibility, when desired, to play again to get a new position and a new score within the deadline set for this evaluation (01/11 to 25/11/21).

The use of the internet was necessary for the execution of the digital games and, in this process, everyone was involved. After the end of the activities, all participants received a balloon as a demonstration of joy and happiness for the completion of the activities and a gift chain (made with Eva, string and cardboard) containing motivational messages of congratulations, thanks and encouragement to study as a form of recognition and honor to the merit.

#### **4.9 Video Production**

The students were directed to develop practical activities in their homes. At the time, they were asked to separate the solid waste generated in the kitchen and bathroom. In this context, the proper accompaniment of the Family was requested in order to help the students, in locu. In this experience, the characteristics of the waste produced in the students' kitchens and bathrooms were examined and it was found that the most common types of waste were disposable packaging materials, such as: plastics, Styrofoam, glass, PVC films, different types of paper, bottles, plastic bags, powder and organic waste. After the filming was delivered, the characteristics of the kitchen and bathroom waste were reviewed, and a small discussion forum was held in the school space, where educational videos were worked on to encourage, reinforce, and spread the practice of the 3R's in the context of everyday life, followed by classroom activities and activities at home with feedback and corrections. The evidence of this stage had a deadline, grade assignment, and feedback to parents and students, with messages of encouragement in the school WhatsApp group of the 1st grade of elementary school, with emojis and stickers. Meanwhile, they talked about the production of compost and the possibility of suggestions for the reuse of packaging to mitigate the environmental impacts caused by the production and generation of solid waste. In this stage advances in autonomy, language, expression of feelings, and cognition of the students were noticed. The class in general kept organized in the stages of the activities, meeting the stipulated deadlines, and were able to, in fact, carry out the activities that had been proposed. The children and their families were involved and committed to the production of the video. There was good acceptance and the expected result was achieved.

## **CONCLUSIONS**

It is concluded that the knowledge and experiences in Environmental Education are relevant to the Elementary School, since this stage of Basic Education is charged with developing principles, positions and ethical actions at the base of Education through experiences of teaching-learning that provides

citizenship and the transmutation of the individual student-citizen. This didactic sequence, in the reality of Environmental Education, allied theory and practice, in an interdisciplinary way. In this context, possible and environmentally adequate activities (individual, group, exercises, musicalization, lectures, gamification, and practical workshop of the 3R's) were developed. At the beginning of this course, it was noticed that the students did not have an understanding about the 3R's, but the applicability of the didactic sequence, with the mediation of knowledge, allowed clarification and knowledge about the ways to take care of the environment and reuse solid waste that previously would possibly be discarded for lack of information and knowledge. The students have observed, therefore, that the environment encompasses everything around them, that the applicability of the 3R's is possible, that conscious consumption is necessary, the difference between trash and solid waste, that planet Earth is our home, that the incorrect disposal of trash reaches us, that man's action towards the environment has a consequence, and that teaching-learning goes beyond books and notebooks. Theory and practice are not unlinked and what is learned at school must be put into practice in everyday life. Environmental Education articulated with these educational experiences made it possible to reflect on values and the need for attitudinal changes. Therefore, it is up to the society, its sectors, and the government to create measures to reduce the impact, promote environmental care and preservation. During this trajectory, positive advances and results have been seen, such as: the students' resourcefulness in the cognitive, motor, linguistic, mathematical, artistic, social, and aesthetic aspects. There was the presence, the involvement, and the participation of the students' families. Interdisciplinarity and transversality in Environmental Education made it possible to work concepts, strengthen autonomy, build knowledge, deepen critical reflection in the real environmental context with the applicability of the 3R's, thus developing skills and abilities. The didactic continuation of this study signaled that Education leverages and elevates our lives in multiple aspects. The contact of students with the steps of didactic continuation made in this study contributed to a better understanding about the causes, harmful effects linked to waste, excessive consumption, incorrect disposal and the consequences of this to the environment, thus enabling a better understanding of the environment, the practices of the 3R's, waste, solid waste and sustainability actions.

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