




ENVIRONMENTAL EDUCATION AND WASTE MANAGEMENT: SUSTAINABLE PRACTICES TO MINIMIZE ENVIRONMENTAL DEGRADATION

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ABSTRACT

The objective of this research was to analyze the sustainable practices of environmental education and waste management, investigating how these practices can contribute to the minimization of environmental degradation. The research was descriptive and qualitative in nature, with a sample of 27 professionals in the area, who participated in semi-structured interviews. Data collection was carried out through these interviews, whose reports were analyzed using the content analysis technique. The results indicated that, despite a growing awareness of the importance of environmental education, waste management still faces

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significant challenges, such as lack of infrastructure, financial resources and cultural resistance. However, sustainable practices, especially those aimed at education and community involvement, have proven effective, especially among the new generations. The research concludes that an integrated approach between public policies, private initiatives and community participation, as well as investments in education and infrastructure, is essential to improve waste management and ensure an environmentally sustainable future.

Keywords: Environmental education. Waste management. Environmental degradation.

INTRODUCTION

Environmental education is a field that has stood out in recent years as an essential tool for raising awareness and changing behavior in relation to the environment. With the increase in environmental degradation and the depletion of natural resources, the need to promote a greater understanding of the impacts of human actions on the planet has become evident. Through environmental education, it seeks to empower individuals and communities to adopt more sustainable and responsible practices, minimizing damage to the environment. This movement covers several areas, such as the rational use of natural resources, the preservation of biodiversity, and the implementation of more ecological alternatives for the disposal and reuse of waste (Oliveira; Neiman, 2020).

The increase in the production of solid waste is one of the most visible consequences of accelerated urban and industrial development. Expanding cities, the search for consumerism and the lack of adequate infrastructure for waste management result in a growing volume of garbage, which is often disposed of inappropriately, generating soil, water and air pollution. Given this scenario, waste management has become one of the major global concerns, being considered one of the main ways to minimize environmental degradation (Rodrigues et al., 2023).

Efficient and responsible management can significantly reduce negative impacts on the environment, contributing to a more sustainable future. Waste management involves not only the collection and transportation, but also the treatment, recycling, and final disposal of waste in an environmentally appropriate manner. The practice of reducing, reusing and recycling is one of the most efficient strategies for reducing the amount of waste generated and for preserving natural resources. However, it is important to highlight that the effectiveness of these practices depends on the active participation of society, the public authorities and the private sector. Everyone must be a protagonist in the search for more efficient solutions for waste management, which includes the development of clean technologies and processes that ensure the sustainability of ecosystems (Roehrig; Cruz, 2023).

In addition, environmental education plays a crucial role in changing habits and promoting more conscious consumption. By integrating sustainable practices into people's daily lives, it is possible not only to reduce the waste generated, but also to encourage the adoption of alternatives such as the use of recyclable, biodegradable products with less environmental impact. Awareness of the importance of waste management should also be combined with the formation of responsible attitudes, such as the proper segregation of

waste, the fight against waste, and the promotion of public policies aimed at sustainable waste management (Silva; Loureiro, 2020).

In many countries, environmental issues have gained greater visibility and waste management has been treated as a priority on political and social agendas. The implementation of stricter legislation, the encouragement of recycling, the creation of tax incentives for companies that adopt sustainable practices, and the creation of public awareness campaigns are some of the strategies adopted to address the challenges related to waste management. However, even with these advances, there are still many obstacles to be overcome, such as the lack of adequate infrastructure, cultural resistance, and the scarcity of financial resources (Siqueira; Santos Filho, 2023).

The impact of environmental degradation, associated with the accumulation of waste, also directly affects public health and the quality of life of populations. Improper waste disposal can cause the proliferation of diseases, contamination of water sources, and the worsening of global warming. Therefore, sustainable practices, combined with environmental education and effective waste management, are essential to ensure a healthier and more balanced environment. In an increasingly interconnected world, individual and collective actions for environmental preservation have a direct impact on global well-being (Siqueira; Santos Filho, 2023).

In view of the above, the objective of this research was to analyze the sustainable practices of environmental education and waste management as fundamental strategies for minimizing environmental degradation. The research aims to understand how society's awareness and the implementation of effective public policies can contribute to the creation of a more sustainable environment, reducing the impact of waste on the ecosystem and promoting a more balanced future for the next generations.

METHODOLOGY

The research was conducted in a descriptive and qualitative way, with the aim of understanding the practices related to environmental education and waste management in different contexts. The descriptive approach was chosen to provide a detailed view of the attitudes, knowledge and practices adopted by the professionals involved in the waste management process, while the qualitative approach allowed a deeper analysis of the perceptions and experiences of the participants, focusing on the meanings and interpretations they attribute to the environmental issue. This type of research seeks to explore in depth the subjective aspects and motivations of individuals in relation to the

theme (Lima; Domingues Junior; Gomes, 2023; File; Domingues Junior; Silva, 2024; File; Silva; Domingues Júnior, 2024; Kvitko; Parisotto; Baldissarelli, 2024).

The research sample was composed of 27 professionals who work directly in the area of waste management and environmental education. These professionals were selected based on their experience and performance in different sectors, such as companies, public agencies, NGOs and educational institutions, providing a comprehensive view on the subject. The diversity of the sample allowed us to capture different perspectives on waste management practices and the environmental education approaches adopted by these professionals in their respective fields of activity.

Data collection was carried out through semi-structured interviews, which allowed for a more flexible and rich interaction with the participants. The interviews were conducted individually, in order to ensure that each participant could express their opinions, experiences and perceptions freely. The interview script was prepared with open questions, addressing topics such as the importance of environmental education, the difficulties faced in waste management, the practices adopted on a daily basis and suggestions for improvements in waste management. In addition, the interviews were recorded, with the proper consent of the participants, to ensure the accuracy of the information. After collection, the data were transcribed and organized for analysis.

Data analysis followed a qualitative approach, using the content analysis technique. This method allowed the identification of patterns, categories, and recurring themes in the participants' responses, facilitating the interpretation of the data in a more structured way. During the analysis, we sought to understand the relationships between the sustainable practices adopted by the professionals and the perceptions about the challenges and opportunities for improving waste management.

RESULTS AND DATA ANALYSIS

The results of the research show a wide diversity of practices and perceptions about environmental education and waste management, with a focus on the strategies used by professionals who work directly in these fields. During the interviews, respondents reported a growing awareness of the environmental impacts of human activities, but also highlighted the difficulties in implementing effective changes.

According to Respondent 1 (E1), "Environmental education is fundamental, but there is a lack of structural and financial support so that we can put into practice all the actions we know are necessary." This report demonstrates that, although there is an understanding of

the importance of environmental education, the institutional and financial context can be a significant obstacle.

Another highlight in the participants' reports was the finding that waste management is still a major challenge, especially in regions with precarious infrastructure. Respondent 4 (E4) stated: "In many areas of the city, separate collection is not yet a reality, and people do not have adequate options to dispose of waste in a sustainable way." This statement highlights the limitation of infrastructure as a factor that directly impacts the effectiveness of waste management practices.

In addition, the lack of clear information about the final destination of waste was also mentioned as an important barrier to the population's engagement in more responsible practices. Efficient waste management is a recurring theme in the testimonials, with many professionals highlighting the need for more effective strategies to encourage reduction, reuse, and recycling. Respondent 5 (E5) shared: "Despite awareness campaigns, most of the population still has difficulty separating garbage properly, and often, recyclable material ends up in the common garbage." This highlights the importance of continuing education on good waste separation practices and the need for more collection points for recyclable materials.

On the other hand, Respondent 2 (E2) brought an optimistic view, saying: "In schools and among young people, environmental awareness has been much stronger. They bring it home and teach the parents how to do the proper separation." This commentary highlights the positive impact that environmental education has on new generations and how they can become agents of change in their communities. The implementation of educational programs aimed at raising awareness from an early age can be an effective strategy for the formation of more aware and responsible citizens.

Integration between the public and private sectors was also mentioned as an essential strategy to improve waste management. Respondent 7 (E7) commented: "Greater collaboration between companies and the government is needed to enable more efficient solutions for waste management. Companies that generate large volumes of waste must be held more accountable and encouraged to adopt sustainable practices." This testimony highlights the relevance of joint action between different sectors so that waste management actions become broader and more effective.

However, Respondent 6 (E6) made a criticism regarding the lack of more assertive public policies: "Public policies exist, but they are not sufficient or well executed. The lack of oversight and the unpreparedness of many public managers make it difficult to implement sustainable actions." This critical view reveals an important gap between the creation of

standards and their effective implementation, suggesting that, in order to make real progress, a stronger commitment and a structure that is better able to deal with environmental problems is needed.

The results also indicate that waste management practices are directly related to the education and environmental awareness of the population. Respondent 3 (E3) stated, "When we conduct workshops in the communities, we see a major change in behavior. People become more interested in learning how to reduce waste, recycle, and even compost at home." This confirms the importance of environmental education actions that promote the active participation of citizens, providing them with practical information for the adoption of more sustainable behaviors.

Another important aspect identified in the survey was the perception of the role of companies in waste management. Respondent 8 (E8) pointed out: "Companies need to go beyond the discourse and adopt concrete practices, such as reducing the use of plastic packaging and implementing efficient recycling systems." In fact, many companies have the ability to positively influence waste management by adopting innovative and sustainable solutions that not only meet market demand but also contribute to environmental preservation.

The impact of the lack of environmental awareness was also highlighted by several respondents. Respondent 9 (E9) said: "Many people still do not understand that waste management is not just a responsibility of the government, but of everyone. A joint effort is needed to prevent garbage from accumulating in urban spaces and rivers." This statement reinforces the idea that awareness should be a collective effort, involving different spheres of society so that sustainable practices become cultural habits.

In addition, the survey revealed that, despite the challenges, there are advances in some areas. Respondent 10 (E10) observed: "In some municipalities, selective collection initiatives are expanding, and this has generated positive results, such as reducing the volume of waste sent to landfills." This suggests that, with adequate investment and efficient public policies, it is possible to achieve positive results in waste management, promoting a cleaner and healthier environment.

The lack of financial resources was also a constant concern among respondents. Respondent 11 (E11) stated: "The lack of investment in infrastructure for waste collection and recycling is one of the biggest obstacles to the implementation of more efficient practices." The scarcity of financial resources, especially in poorer regions, can hinder the implementation of more effective solutions for waste management, highlighting the need for greater allocation of resources by governments.

On the other hand, Respondent 12 (E12) emphasized the importance of community partnerships: "In poorer communities, we have seen that when the population is directly involved in the process, the solutions for waste management end up being more effective." This testimony highlights the effectiveness of community-based solutions, in which residents become active in managing their own waste, creating a sense of collective responsibility.

The survey also revealed that many professionals believe that environmental education should go beyond schools and be incorporated in a transversal way in different areas. Respondent 13 (E13) commented: "Environmental education should be a continuous practice in all spheres of society, from schools to companies and government agencies." This suggests that environmental education should be an integrated approach, which permeates the various institutions and sectors of society.

Finally, Respondent 14 (E14) shared a perspective on the future: "If we can invest more in technological solutions for waste management and promote greater integration between education and practical action, we can have a more sustainable future." This report reflects the hope that through technological innovations and greater awareness, it will be possible to reverse the impacts of environmental degradation and improve waste management around the world.

FINAL CONSIDERATIONS

The survey revealed that environmental education and waste management are areas of great importance, but that they still face many challenges to be effectively implemented in a broad and sustainable way. While there is a growing awareness of the importance of these issues, especially among professionals in the field, the lack of adequate infrastructure, limited financial resources, and cultural resistance are still significant obstacles. The analysis of the data showed that collaboration between different sectors of society, including the public and the private, is essential to achieve more effective results in waste management.

In addition, the results indicate that environmental education must be integrated continuously at all levels of society, from schools to companies and governments. Awareness, when done effectively, can lead to a significant change in behavior, especially in the new generations. Investment in educational programs and sustainable practices can generate positive impacts in the long term, both in reducing waste production and promoting more responsible habits.

Waste management, although challenging, can be improved through more assertive public policies, greater inspection and, above all, the active participation of society. The research pointed out that when the population is directly involved in the waste management process, the results tend to be more effective. Environmental education plays a key role in this process, as it empowers citizens to adopt more conscious and responsible practices.

However, the survey also indicated that there is a lack of financial resources and adequate infrastructure in many regions, which makes it difficult to implement more sustainable solutions. To overcome these challenges, there needs to be a joint effort between governments, businesses and citizens in order to promote investments and create innovative solutions for waste management.

In addition, public awareness and environmental education should be seen as strategic tools for transforming collective behavior. The advances observed in some areas, such as the expansion of selective collection and the incentive to recycling, show that, with adequate support, it is possible to reduce the amount of waste generated and improve environmental quality. Collaboration between different sectors and the creation of more effective public policies are key to promoting sustainability and ensuring a more balanced future.

In short, the research highlighted the importance of environmental education as a strategy to minimize environmental degradation and the need for an integrated approach to waste management. With investments in education, infrastructure, and efficient public policies, it is possible to move towards more sustainable practices, reducing environmental impacts and promoting a healthier future for the next generations.

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