

Blog as a Pedagogical Strategy to Enhance Learning About Household Solid Waste

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ABSTRACT

Background: In contemporary times, challenges in the field of education are growing, especially regarding the integration of different methods of student engagement and training. Technology emerges with possibilities for innovative strategies aimed at enhancing learning and contributing to addressing environmental issues effectively. Teachers, in their pedagogical practices, should take into account the socio-environmental reality and integrate Environmental Education for participatory interventions in environmental issues. The use of blogs in Science education enables a more engaging interaction with the content, resulting in a more meaningful and contextualised learning experience. **Objectives:** To develop a blog to address household solid waste management and evaluate it as a technological tool for enhancing understanding of household solid waste management. **Design:** The methodology employed in this research was a qualitative approach. **Setting and Participants:** Thirty-five students from two seventh-grade classes at São Francisco Municipal Elementary School in the municipality of Tupandi/RS. **Data collection and analysis:** Two questionnaires were administered to the students, one pre-activity and another post-activity, and a blog was developed in each class. The quantitative data were analysed through descriptive statistical analysis, while the qualitative data were subjected to content analysis. **Results:** Most students had no prior experience with blogging, and their limited knowledge of the concept was associated with using the media tool as a page for posting personal life details. During the blog development, students did not encounter difficulties handling the platform's icons. The evaluation characterised the blog as a positive learning tool regarding household solid waste management, recognised by the students as meaningful in classroom practices. **Conclusions:** The development of blogs served as a technological and pedagogical strategy that facilitated learning about household solid waste management, connecting with the local reality and fostering a sense of ownership and responsibility among the students, aligning with one of the purposes of Environmental Education. Furthermore,

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the integration of the blog in Science education enabled the establishment of a collaborative and dynamic network for knowledge exchange, as well as the cultivation of skills related to digital literacy.

Keywords: Blog; Household solid waste; Technological and pedagogical strategy; Environmental Education.

Blog como estratégia pedagógica para potencializar o aprendizado sobre resíduos sólidos domiciliares

RESUMO

Contexto: Na contemporaneidade, crescem os desafios no campo da educação, especialmente no que se refere à integração de diferentes métodos de engajamento e formação dos alunos. A tecnologia surge com possibilidades de estratégias inovadoras que visam potencializar o aprendizado e contribuir para abordar as questões ambientais de maneira eficaz. Os professores, em suas práticas pedagógicas, devem considerar a realidade socioambiental e incorporar a Educação Ambiental para intervenções participativas na questão ambiental. O uso de blogs no ensino de Ciências possibilita uma interação mais envolvente com o conteúdo, resultando em um aprendizado mais significativo e contextualizado. **Objetivos:** Desenvolver um *blog* para trabalhar a gestão dos resíduos sólidos domiciliares e avaliá-lo como ferramenta tecnológica para o melhor entendimento da gestão dos resíduos sólidos domiciliares. **Design:** A metodologia empregada nesta pesquisa foi de abordagem qualitativa. **Ambiente e participantes:** Trinta e cinco estudantes de duas turmas do sétimo ano da Escola Municipal de Ensino Fundamental São Francisco, localizada no município de Tupandi/RS. **Coleta e análise de dados:** Aplicaram-se dois questionários aos discentes, um pré e outro pós-atividade, e desenvolveu-se um *blog* em cada turma. Os dados quantitativos foram analisados por análise estatística descritiva e os dados qualitativos por análise de conteúdo. **Resultados:** A maioria dos estudantes não possuía autoria em *blog* e o pouco conhecimento sobre o conceito estava associado ao emprego do recurso midiático como uma página de postagens sobre detalhes da vida pessoal. Durante o desenvolvimento do *blog*, os estudantes não apresentaram dificuldades em manusear os ícones da plataforma. A avaliação caracterizou o *blog* como uma ferramenta positiva de aprendizado sobre a temática dos resíduos sólidos domiciliares, reconhecida pelos discentes como significativa nas práticas em sala de aula. **Conclusões:** O desenvolvimento dos *blogs* constituiu uma estratégia tecnológica e pedagógica facilitadora da aprendizagem sobre resíduos sólidos domiciliares, perpassando pela realidade local e fomentando um sentimento de pertencimento e responsabilidade nos estudantes, alinhando-se a um dos propósitos da Educação Ambiental. Além disso, a integração do *blog* no ensino de Ciências permitiu estabelecer uma rede colaborativa e dinâmica de troca de conhecimentos, bem como para a formação das habilidades relacionadas ao letramento digital.

Palavras-chave: Blog; Resíduos Sólidos Domiciliares; Estratégia tecnológica e pedagógica; Educação Ambiental.

INTRODUCTION

Technological innovations have triggered significant changes in society. The interaction of individuals with the various available resources triggers repercussions in their lives and in how they understand the world (Zompero *et al.*, 2018). When discussing matters of education, it is essential to consider this conjecture to continuously refine strategies aimed at enhancing the educational process.

In the face of a digital world, educational challenges increase, involving the training of teachers and the incorporation of new modes of student engagement and formation. Overcoming these challenges, coupled with the appropriate use of technological tools, results in the enhancement of teaching and learning, offering pedagogical practices a more dynamic, interactive movement that aligns with students' reality. Cueva and Inga (2022) reaffirm that technology applied in educational activities promotes critical thinking and autonomous, collaborative work, making it essential to stay updated on these resources, as they are sociocultural elements that prepare students for new realities and competencies.

Parreira, Lehmann, and Oliveira (2021) emphasize that these educational demands stem from the technoscientific revolution, which is crucial for understanding modern changes. Moreover, it enables new social dynamics and novel conceptions of individual and collective identity. Consequently, it becomes imperative to advance reflections on the implications of these technological innovations, shaping knowledge opportunities and reconfiguring teaching and learning processes. Grasping this movement opens up new methodologies that drive the quality of education forward.

In view of this, Martins *et al.* (2020) highlight the relevance of how the development of knowledge about Digital Information and Communication Technologies (DICT) in the school environment is conducted, an aspect that goes beyond discussions about the presence or absence of these resources in these spaces. As indicated by Pinheiro and Pinheiro (2021), the school assumes the role of promoting the formation of responsible and critical students regarding the use of DICT, contributing to the education of individuals who not only master technology but are capable of using it consciously for their benefits and that of society. In this perspective, Cueva and Inga (2022) infer an

educational transformation with the incorporation of new methodological approaches, and for progress in this field, they consider the integration of DICT indispensable. This implies the training of educators regarding educational technological tools.

In Science Education, DICT stimulates reasoning and contribute to overcoming abstract concepts that constitute the phenomena addressed in this curriculum component. Faiões (2022) points out that the purpose of technological resources is aimed at pedagogical support for interactive activities proposed in Science education. Through this integration, students take on a leading role in the construction of knowledge in a process of interpretation, evaluation, and reflection.

Technological change is a trend strongly intertwined with the health of the planet. Society is facing numerous social, cultural, and moral dilemmas that are connected to technological development. However, there is a certain rigidity in schools when it comes to keeping up with the fast pace of the advent of DICT. Education in a rapidly changing world poses a significant challenge. Additionally, there is a need to redefine educational objectives in light of current sustainability issues. Thus, education in general, and Science education in particular, aim to provide teaching and learning that are relevant to individuals, society, and the future of the planet (Rasa, Lavonen & Laherto, 2023).

The perspective of Espíndola and Gianella (2018) maintains that the integration of DICT in Science education contributes to addressing obstacles in students' learning within this curriculum component. Consequently, it also fosters the overcoming of traditional practices, which rely on passive transmission and content fragmentation, simplifying the learning of scientific concepts and phenomena. Considering this purpose, educators' selection of DICT must be linked to the specificities of the subject and encompass a variety of resources according to the objectives. This diversification enhances the teaching and learning process and establishes connections between scientific knowledge and the student's context. In this way, the contextualization and application of concepts are realized through concrete experiences.

In line with this, Lehmann and Parreira (2019) affirm that applying knowledge in real everyday situations does not happen immediately, but relies on the means that enable such application. Technological resources, while not the only ones, are designated as tangible means for this intervention to take place (Lehmann & Parreira, 2019), and they are proposed in the National Common Core Curriculum (BNCC). According to this guiding document, all

this technological landscape presents challenges to educational institutions in fulfilling their duty regarding the education of future generations. Therefore, it is relevant for schools to maintain their commitment to promoting the ability for reflection and in-depth analysis in students, as well as contributing to the development of critical attitudes towards content and the multitude of digital media resources (Brazil, 2017). Furthermore, the BNCC highlights the importance of understanding and adopting new languages by educational institutions, as well as clarifying opportunities for communication and manipulation of technologies, guiding towards a democratic and conscious use of these resources. By leveraging the communicative potential of digital culture, new possibilities for interactivity and the promotion of learning are attainable within the school environment (Brazil, 2017).

In this perspective, technology is proposed as an innovative resource in solving various problems, which can yield positive results in addressing environmental issues. When analyzing societal development, it's evident that numerous urban problems are arising, among which improper solid waste disposal stands out. This issue can be readily observed on the streets and public areas, resulting in unpleasant and polluted environments and impacting human health (Amorim & Medeiros, 2020). In this way, it is believed that the integration of DICT with Environmental Education provides an opportunity for the production and dissemination of knowledge regarding proper solid waste management, as well as the environmental, social, and economic impacts of improper practices.

Educational practices focused on the discussion of environmental issues, enabling individuals to learn new values with the aim of promoting changes in both individual and collective actions, and thereby improving quality of life, are integral to what is known as Environmental Education. This realm encompasses a wide variety of perspectives and approaches due, among other reasons, to the range of contexts related to diverse socio-environmental challenges, which involve solutions encompassing ethical, moral, cultural, and economic dimensions, among others (Grandisoli, Curvelo & Neiman, 2021).

Amongst this array of environmental challenges, the discussion surrounding solid waste stands out. The constant increase in the production of these materials, many of which are slow to decompose, presents a concern at local, regional, and global levels. The improper management of these wastes, coupled with a lack of habits related to reduction, reuse, and recycling, contribute to the degradation of ecosystems and threaten the planet's biodiversity. Confronting this issue, which arises from improper management,

requires crucial measures from everyone, both leaders and citizens, to minimize the negative impact of these materials on the environment.

However, it is understood that waste generation is an inherent characteristic of human survival. Based on this premise, Guerra *et al.* (2020) affirm that Environmental Education has the responsibility of inspiring reflections and actions in the face of environmental challenges. However, for it to be effective within the environmental context, it demands active educational approaches that reshape the teaching and learning process. In this regard, pedagogical strategies require an understanding of the socio-environmental reality they are embedded in, enabling participatory intervention grounded in clear and purposeful objectives (Grandisoli, Curvelo & Neiman, 2021).

The National Solid Waste Policy establishes the regulations that govern the management of solid waste in Brazil. In this manner, it addresses principles, objectives, and tools, guiding towards the integrated management and handling of solid waste, including the responsibilities of the government and those generating the waste (Brazil, 2010).

In the face of the solid waste issue, the functioning of this system alongside educational practices, enabled by the actions of key sectors of society, municipal administrators, and educational institutions, promote habits of a healthy and sustainable city (Almeida *et al.*, 2022). However, it's evident that one of the exacerbating factors in this situation persists in the lack of proper knowledge among citizens regarding the correct disposal of solid waste. In this condition, in addition to the efficient implementation of selective collection services, promoting a sustainable mindset is crucial. This approach to Environmental Education enables significant contributions to changing people's habits, resulting in more effective solid waste management (Silva, 2021). It's apparent, therefore, that proper solid waste management has positive impacts on the environment and is directly related to individuals' quality of life (Almeida *et al.*, 2022).

Therefore, it is of utmost importance to understand socio-environmental issues, such as solid waste, enabling individuals to reflect on their role as members of society. This foundation entails a more sustainable stance and influences advocating for conscious measures toward a healthier future (Borges, Farias & Souza, 2020).

In a predominantly consumerist society, it becomes essential to discuss environmental issues for the development of critical thinking and the adoption of healthy and sustainable habits (Brazil, 2022). According to Ribeiro, Passos,

and Salgado (2019), the relevance of environmental studies that effectively foster critical and reflective thinking in students is gaining increasing prominence in the educational sphere. According to the BNCC, which establishes Environmental Education as a contemporary cross-cutting theme, these practices aim to educate students to exercise environmental citizenship, equipping them to face environmental challenges and to think about the future conscientiously and responsibly, especially in a context where sustainability is urgent and valued. Therefore, considering these circumstances, Environmental Education is proposed to build learning pathways that stimulate the perception of the inherently linked relationship between collective future planning and a better quality of life, based on the act of collectively planning the future in an environmentally sustainable perspective (Brazil, 2022).

Addressing sustainability objectives in the classroom poses a challenge for educators, as they encounter a crowded curriculum and require proper knowledge about the subject. Furthermore, for this purpose, pedagogical knowledge is necessary for the use of appropriate and innovative methodologies (Murphy *et al.*, 2020).

Furthermore, for the success of educational practices focused on sustainability, it becomes relevant to explore new ways of engaging and empowering students. In a world of constant transformations, numerous opportunities for innovation and approaches to Environmental Education arise. According to Rasa, Lavonen, and Laherto (2023), the concern for contemporary social and environmental issues underscores the importance of pedagogies that prepare students and inspire them to take action in addressing societal challenges. Thus, Caiman and Kjällander (2023) point to digital resources for exploring and learning about environmental and ecological issues in both virtual and physical environments, allowing students to document their discoveries and share them with others. This physical and digital interface can contribute to a more engaging and immersive learning experience, particularly for students growing up in a digital environment.

Portugal *et al.* (2023) assure that changing habits is complex to achieve, and for success, the implementation of different teaching methodologies in Environmental Education is unquestionably necessary. Additionally, to promote healthy behaviors related to solid waste, particularly household waste, DICT come into play, which, according to Pereira and Lopes (2020), facilitate establishing connections between the knowledge about the subject and the reality in which students are immersed. Vieira and Silva (2018) confirm that various strategies are employed in the teaching and learning process, such as

educational blogs, aiming to enhance knowledge construction and intensify pedagogical interaction.

Blogs have various applications that assist in social interactions, which demonstrates the need for further studies on this tool to analyze its impacts across different social segments (Li, 2022). In light of this, they can be regarded as facilitators of knowledge synthesis and development, owing to their potential for dialogue and interaction among users (Turvey & Hayler, 2017).

Blogs were not originally designed for educational purposes. Initially, their main intention was the sharing of information and curiosities about specific subjects among like-minded groups, or for the creation of a personal brand on the internet. Over time, due to their simple presentation, they became a platform for rapid dissemination, allowing the exchange of information about common interests (Costa, 2018). Subsequently, their increasing integration into the educational space has proven to be relevant due to their interactive characteristics.

Currently, a blog is a technological and didactic resource that promotes an environment for sharing information and enables individual and collective creations. In this sense, it represents a versatile tool that is easy for educators to use and socially engaging for students, facilitating a meeting point for the two generations for dialogic and functional communication (Silva & Orkiel, 2018). Vieira and Silva (2018) concur by specifying that the blog, due to its specific nature, fundamentally contributes to the socialization of knowledge. Participation in the construction of a blog offers an experience of interaction and engagement with the content, fostering more active and meaningful learning. Through this participatory approach, the blog transcends mere passive knowledge transmission, inviting students to collaboratively construct their learning.

Costa (2018) argues that educational blogs emerge as a conducive space for promoting students' interest and participation, encouraging their engagement with the subject matter. Thus, this platform enables a more interactive and dynamic teaching, yielding positive outcomes for students' meaningful learning. Furthermore, this resource also facilitates the involvement of students and teachers in a virtual community, aiming to interact, share knowledge, and collaboratively build an approach to learning.

Moreover, this media resource enables the use of various pedagogical materials such as text, images, audio, videos, and graphics. The language of a blog can bring students closer to the educational space, as they are familiar with

this type of communication environment, leading to greater participation and engagement (Hardagh & Correia, 2020). In summary, blogs constitute a valuable educational resource, bridging the gap between information dissemination and a closer relationship between educational subjects and the realm of content (Costa, 2018).

Considering this, the development of a blog can constitute an empowering strategy for engaging and interactive educational experiences. Furthermore, it enables moments of reflection and responsible actions towards the environment, as it seeks to align with social changes, which are in turn reflected in educational environments (Silva & Orkiel, 2018).

This article presents a segment of an ongoing master's research and emphasizes its relevance in connecting environmental, social, and technological issues in Science education. This connection arises from the complex reality we live in, enabling students to perceive the correlation between socio-environmental and technological aspects and develop an integrated perspective. Thus, the guiding question is: What is the contribution of a blog as a technological and pedagogical tool to address household solid waste? Therefore, the objective was to develop a blog to address household solid waste management and evaluate it as a technological tool for enhancing the understanding of household solid waste management.

METHODOLOGY

The approach of this research is classified as qualitative, which, according to Pesce and Abreu (2013), directs its relevance towards the meanings constructed by the subjects involved in the investigated phenomenon. Regarding the methodology, it is an action research, which, as described by Thiollent and Colette (2014), enables the promotion of critical thinking and decision-making by the involved actors through addressing social issues.

Regarding ethical considerations, this research was approved by the Human Research Ethics Committee of the Lutheran University of Brazil, through the Brazil platform, under the number CAAE: 60604422.6.0000.5349. The thirty-five 7th-grade students from São Francisco Municipal Elementary School, located in the city of Tupandi/RS, who chose to participate, were granted permission by their guardians and signed the necessary documents. In terms of confidentiality, during data transcription, each student was identified with the letter E followed by a number from 1 to 35.

For the development of the blogs, the Google Blogger platform was utilized. The choice of this tool is justified by its characteristics of being a free, user-friendly environment in the educational space, as it provides tools for creating, editing, and managing blogs. In this process, each of the two classes created their own blog, personalizing it with the templates offered for visual appearance and making the posts. These posts were related to materials developed by the students themselves during Science classes on the topic of household solid waste. Thus, in total, each class posted five different materials on the blog concerning subjects related to household solid waste and the local reality.

During the investigative process, in addition to creating the blog, two questionnaires were administered: pre-activity and post-activity. Both questionnaires consisted of open-ended and closed-ended questions with the aim of developing this media resource and evaluating it as a technological tool for enhancing the understanding of household solid waste management. The qualitative data were treated using the Content Analysis proposed by Bardin (2011). Descriptive statistics were employed for the analysis of quantitative data, expressing the results through frequency and percentage analyses. Additionally, a diary was used to record observations and students' expressions during the research execution. Throughout the results, some student accounts are presented without identification, as they were extracted from the diary.

RESULTS AND ANALYSES

For the analysis of the results, tables were established with data related to the frequencies of responses regarding the Likert scale questions. In the open-ended questions, the corpus containing elementary context units, segmented by theme, was similarly organized into tables. This construction into categories a posteriori (primary and/or secondary) resulted from grouping by similarity and adopting the lexical criterion, indicating frequencies and percentage frequencies.

Initially, a questionnaire was administered aimed at understanding the students' knowledge about the concept of a blog. This allowed for profiling the students, of whom 51.4% identified as male, while 48.6% identified as female. In terms of age, the majority of participants, namely 51.4%, were 13 years old, followed by 34.3% at 12 years old and 14.3% at 11 years old.

Regarding the technological profile, it is important to highlight that all students possess a technological device and have internet access, indicating that

technology and connectivity are integrated into their daily lives. This characteristic is essential for enhancing the educational process and understanding how students engage with knowledge. Ribeiro (2019) infers that all participants in her study, consisting of ninth-grade students, have access to a technological device and the internet, with the majority being connected daily for various purposes. According to the author, this constitutes a cultural aspect that needs to be considered in the construction of knowledge within the school environment, as numerous contributions emphasize DICT in promoting learning. As evidenced by Scheunemann (2022), students exhibit an innate proficiency with DICT due to being digital natives, configuring new ways of communicating, interacting, and seeking information. Therefore, it is essential for the educational environment to keep pace with this transformation, which reflects a societal need in this evolving dynamic, thus translating into an educational demand of contemporary society.

When asked about the technological resources they use, it is noteworthy that none of the students mentioned the use of blogs. This data is relevant to the extent that, despite the wide availability of blogs on the internet, characterizing them as a source of information on a variety of subjects, this DICT is not present in the technological landscape of the learners. This fact may be linked to a lack of knowledge about the importance that this type of platform has taken on for studies, considering that its usage history does not guide it towards an educational tool. According to Diesel *et al.* (2018), DICT such as blogs are still underexplored and not widely integrated into educational practices by educators. Faced with this observation, the authors highlight the need to promote pedagogical actions that harness the educational potential of this media realm, addressing access to updated and dynamic information.

Next, in Table 1, we address the students' responses regarding the question "Have you ever created a blog?":

Table 1

Development of blogs by the students

Never	Rarely	Sometimes	Often	Always
32	2	0	0	1

The data presented above indicate that 91.5% of the respondents have no experience with creating a blog, while only 2.8% do so always. It is evident from this premise that this DICT is not used in the classroom, which signifies an opportunity to enhance the integration of this resource into educational practice. Salgado and Gautério (2020) characterize the use of DICT as an interesting and distinct perspective in teaching practice. However, they emphasize that some, like blogs, are known only to a small portion of students, underscoring that this resource in the classroom remains underexplored and its potential is not widely recognized. The study by Rios (2018) found that among the 46 participants in the research, 24% reported having experience with blog authorship, while 76% had not engaged with this media resource. Furthermore, the findings highlight that 34% of students had the habit of conducting research through this medium.

When asked about "Do you know what a blog is? If yes, please explain:", there were responses that have been categorized and are indicated in Table 2.

Table 2

Knowledge about blogs

Category	Primary subcategory	Secondary subcategory	f	%
Knowledge about Blogs	Posts	Personal routine	7	20
		Information about a specific subject	1	2,9
Did not respond			27	77,1
Total			35	100

It's observed that 77.1% of the students were unable to answer this question, showing a lack of knowledge and familiarity with blogs in their daily lives. For 20% of the students, this media resource represents a page of posts about personal life details, as mentioned in their responses: "*where people write about themselves*" (E7) and "*where people talk about their daily activities*" (E8).

Lima, Loureiro, and Rabelo (2021) present similar findings regarding the understanding of the concept, where six students refer to blogs as a form of personal diary, sharing aspects of their personal lives. According to the authors' research, six students couldn't explain the meaning, and another five explained in a generalized manner, preventing them from linking their answers to a precise concept.

In a study conducted by Vieira, Belo, and Freire (2020) with students in the initial years of the Pedagogy course, it was found that the majority of these students have some knowledge about blogs; however, their experience with this tool in the educational context is limited or even non-existent. Moreover, for those who had some exposure, the use of this tool catered to individual interests without the guidance of an educator (Vieira, Belo & Freire, 2020). Based on this, it's understood that the inclusion of DICT in teachers' knowledge is necessary so that various technological tools, such as blogs, can be integrated into the daily classroom routine. Rios (2018) reaffirms that integrating DICT into pedagogical practice constitutes a complex challenge, as it requires the development of competencies among teachers. This endeavor demands the mapping of resources and their uses, the construction of narratives, and the interweaving of meanings and relationships that can solidify educational activities. In agreement, Martins *et al.* (2018) argue that the educator is responsible for mediating the integration of these DICT in the classroom, fulfilling their role as an educator but going beyond mere knowledge transmission to assist in building bridges between traditional aspects of teaching and the constant transformations in digital culture. To achieve this goal, teachers also position themselves as learners, recognizing the ongoing need to stay updated and adapt to new technological resources. In doing so, they align their pedagogical practices with the changes of contemporary times.

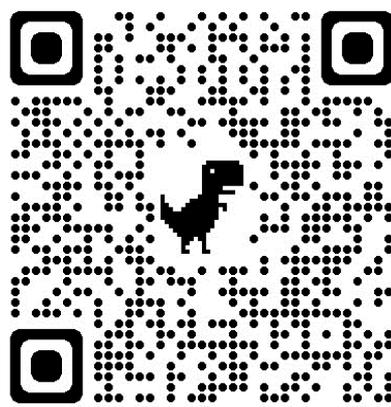
After this phase of identifying students' perceptions about blogs, the next step was entered, where their knowledge was utilized for a discussion and the development of the concept of an educational blog with the students. During the large group debate, various expressions emerged, such as "*a blog is a website*", "*it's where you post things about your life*", "*it's what bloggers do*" and "*I don't know*" which were redefined to construct the concept. From this point, the research phase being proposed was explained, in which the students would develop a blog on the topic of household solid waste.

Next, the Blogger platform was introduced to the students, and a group was assigned to create and define the blog's design in each class. In this process,

the students' interest in making the layout appealing and giving the blog a name could be observed. Thus, a blog was created in each class, which can be accessed using the following codes. In subsequent lessons, pedagogical materials about household solid waste were posted. In this dynamic, during each session, the responsibility for blog publication was assigned to a different group consisting of two, three, or four students.



Class 1's Blog



Class 2's Blog

Both classes had no difficulties in handling the Blogger icons. This premise is in line with the account by Salgado and Gautério (2020), where even with limited knowledge about blogs, students were able to manipulate its effortlessly, highlighting another advantage of blogs – their user-friendliness. This offers an accessible experience, reducing barriers to effective and autonomous student participation. Silva, Cantanhede, and Silva (2020), while developing a blog about atomic models, found that students responded positively to the tool, suggesting it as an easy-to-use and effective resource in supporting the educational process.

Rios (2021) highlights that Blogger offers various possibilities for didactic organization, as its dynamism and versatility allow the integration of links and materials in different digital formats. Furthermore, the management of the blog through this platform is straightforward and independent, which expedites its development and the monitoring of posts and comments. It's evident that these features not only benefit students but also provide an easily accessible tool for teachers, streamlining their learning process and preparing them for a more effective integration into educational activities.

The proposal also involved posting various materials on the blog with the aim of adding dynamism and catering to different forms of communication that might interest students in their pursuit of the subject. In this context, the following were posted: texts, mind maps, graphs, animations, pamphlets, and infographics. Silva, Cantanhede, and Silva (2020) emphasize that the blog developed in their study provided diverse materials, including text and audiovisual content. This approach enabled the use of these publications to enhance the assimilation of the knowledge discussed in the classroom.

At the end of the development phase, the evaluation of the blogs was conducted through a questionnaire consisting of an open-ended question and two closed-ended questions using a Likert scale. The question "Did the blog contribute to your learning? Why?" is categorized in Table 3.

Table 3

Blog as a learning tool

Category	Primary subcategory	f	%
Blog as a Learning Tool	Learning about solid waste	18	45
	Digital Literacy	17	42,5
	Source of Knowledge for Others	3	7,5
	Did Not Contribute	2	5
Total		40	100

The data interpretation positions the blog as a learning tool about solid waste, positively impacting 45% of the participants, as manifested through the following narratives: "*the blog helped me understand the entire waste process*" (E8) and "*we came to understand the content better*" (E27). The incorporation of digital platforms like blogs, as highlighted by Salgado and Gautério (2020), provides a collaborative space of significant relevance for sharing constructed knowledge. This contributes to the establishment of a network of knowledge. In the authors' research, developing a blog provided students with a clear and

objective way to share information across different social spheres. This perspective aligns with Rios' (2021) study, which asserts that this media tool enables new ways of sharing learning, creating room for students to take on a role in crafting and disseminating knowledge. The author emphasizes this media resource as a valuable means for active student engagement in their learning process.

The results of this study align with the research conducted by Carvalho, Gomes, and Braz (2020), indicating that the blog is a relevant alternative for disseminating knowledge, a process crucial for contemporary times. The exchange of reliable information fosters students' intellectual growth and societal progress. Domingues, Santarem, and Leda (2022) highlight the immense versatility of this scientific dissemination resource in terms of the types of content that can be posted. Additionally, the organization of the published materials makes information retrieval accessible. Thus, the blog's collaboration involves adapting posted materials so that information is accessible and comprehensible to students. According to Oliveira, Freitas Júnior, and Cardoso (2023), the incorporation of social media and different applications has demonstrated effective positive outcomes in Environmental Education. The success is attributed to the ability to consider students' individual experiences and backgrounds, along with the presence of these technological elements in the context of the target audience. The recognition and incorporation of DICT in educational practice align the pedagogical approach with the current context concerning technological and environmental issues.

The investigation carried out by Ribeiro (2019) resulted in a blog that addressed topics from the ninth grade curriculum. At the end, all participants in the study marked the blog as an effective tool for learning the content covered in Science classes. Reasons for this positive evaluation include a deeper understanding of the discussed subjects, the fact that it's an engaging resource for students characterized as digital natives, and the enhancement of classroom activities. Furthermore, the students suggest the use of this media tool in other curriculum components.

Furthermore, analyzing the data from Figure 3, the use of the blog as a learning tool is associated with digital literacy for 42.5% of the students. This condition is present in statements such as "*I learned to use the internet better*" (E6), "*because I learned how to create a blog*" (E29), and "*I learned how to make a post*" (E28). One of the contributions of developing the blog, as per Rios' research (2021), relates to information literacy, which fosters critical and

reflective thinking about the use of these technologies. Knowledge and mastery of DICT are essential for responsible student behavior in society. This education enhances skills in understanding, evaluating, and appropriately using information found in these media, encouraging critical and reflective thinking about the digital world (Rios, 2021). Lima, Loureiro, and Rabelo (2021) emphasize that this media resource offers more diverse options for creating electronic content, promoting students' digital literacy. Additionally, the way of organizing and documenting content provides an environment of greater autonomy and personalization. Batista *et al.* (2019) note that constructing a blog focused on environmental awareness and preservation intrigued the students, as it addressed a topic of interest to them, combined with practices aimed at responsible use of DICT. The combination of these factors created an engaging learning space, exploring concepts of environmental themes and engaging them with DICT to promote positive and sustainable changes in society.

Rybakova and Witte (2019) revealed that the use of blogs by educators for educational purposes influenced students' literacy skills and educational practice. The study demonstrated the necessity of effective student engagement with DICT, developing students' ability to conduct internet research and, particularly, to select reliable sources. However, the success of student digital literacy is influenced by the way teachers develop their own literacy skills.

The study by Lima *et al.* (2018) reports on the experience with this media resource as a tool to support knowledge construction. However, the authors observed that the blog did not reach a significant portion of the students in terms of the learning objective. This result indicates that the adoption of DICT can contribute to the educational process, but in this case, it didn't constitute a determining factor in changing students' behavior regarding their studies. Within this context, for strategies involving the use of DICT like blogs, an intentional and planned approach is crucial, requiring active participation from teachers as well to ensure appropriate utilization of the blog and other DICT (Lima *et al.*, 2018).

The following questions used a scoring system ranging from 1 to 5. The responses presented in Table 4 provide insight into the significance of the blog in the educational process.

Table 4

Relevance of the blog in the teaching and learning process

Not important	Slightly important	Moderately important	Very important	Extremely important
0	0	6	18	10

The data reveals that the majority of students recognize that the integration of the blog is significant in classroom practices, with 53% considering it a highly relevant educational resource in the teaching and learning process. Salgado and Gautério (2020) emphasize that the use of digital platforms like blogs establishes a collaborative space that facilitates the creation of a network of knowledge. In the study conducted by these researchers, creating a blog provided students with the opportunity to share knowledge with different audiences, solidifying the clear and accessible dissemination of information. Furthermore, it serves as a bridge between learning in the school environment and its application in real-life situations.

Furthermore, the development of knowledge through the blog becomes more interactive, introducing a more playful and enjoyable approach to teaching Science. This opens up possibilities for a deeper understanding of environmental issues stemming from the constant changes on the planet, including technological advancements (Martins *et al.*, 2018).

The evaluation of the blog on atomic models created in the study by Silva, Cantanhede, and Silva (2020) indicates that 90% of participating students confirm the potential of this media resource in addressing the topic. This validation is supported by the significant contribution that the use of this technological tool showed in enhancing the knowledge-building process regarding the subject. Additionally, in this approach, the students state that the materials posted on the blog played a crucial role in understanding the topic.

In the study by Quadir and Chen (2019), the blog was utilized as an interactive learning environment and resulted in a significant impact on student learning. The authors investigated the following interactions on the blog: student-student, student-teacher, and student-content, and all forms of interaction yielded positive outcomes in the educational process. Michailidis, Kapravelos, and Tsiatsos (2022) conducted research on the use of the blog as a learning environment, exploring its support for self-regulated learning strategies among secondary education students. The results indicate that interaction on the blog had a significant and valuable effect on users, assisting them in self-regulation during the proposed activity and enhancing student engagement. Additionally, the authors emphasize that the blog can be a useful

tool to support learning and teaching in educational settings. Christie and Morris (2021) investigated the use of blogs as an innovative form of assessment in university courses. Students' accounts emphasized greater engagement in classes compared to more conventional assessment methods, providing a more relevant way of evaluation for them. Thus, the study concluded that employing blogs as an assessment strategy prompted students to think independently and take responsibility for their own learning.

Next, the responses to the question about the relevance of the blog for addressing the topic of household solid waste are discussed, and the results are presented in Table 5.

Table 5

Relevance of the blog as a source of information about household solid waste management

Not important	Slightly important	Moderately important	Very important	Extremely important
0	3	1	19	11

A significant number of students (55.9%) consider the use of the blog as highly important as a source of information about the topic, a score that was represented by 20% in the pre-activity phase, signifying a substantial increase after the implementation of this research. Additionally, 32.4% mention it as an extremely important DICT in seeking information about solid waste management. Moreover, the development of the blog facilitated discussions about social issues and the context in which they live. This education is essential for responsible attitudes of students in society (Rios, 2018). This premise aligns with the results of this research, as the blog allowed for discussions about solid waste, a theme prevalent in the students' reality.

The study by Martins *et al.* (2018) developed the blog "Environment and Science Education", highlighting this resource as an example of support for learning environmental topics. One of the topics covered in this Environmental Education blog, solid waste recycling, led to substantial reflections for understanding the theme frequently discussed in media and information channels.

FINAL CONSIDERATIONS

Based on the assumption that a blog holds various potentials, the intention of this study was directed towards the creation of a blog to address household solid waste management and to evaluate it as a technological tool for a better understanding of this topic. Thus, the use of this technological resource was proposed as a didactic strategy to promote Environmental Education in a critical, reflective, and contextualized manner.

Furthermore, for this research, the integration of technological resources with the issue of household solid waste was considered, a topic that is part of Science education and is present in the students' daily lives. The motivation arose from the purpose of developing various strategies to address the concepts of household solid waste, deepening understanding of the subject, and fostering the interest and participation of seventh-grade students in middle school.

This way, the development of blogs constituted a technological and pedagogical tool that facilitated learning about household solid waste, contributing to the understanding of waste management and its environmental impacts. This proposition delved into the local reality, specifically addressing the scenario of household solid waste in the municipality and promoting a sense of ownership and responsibility, encompassing one of the goals of Environmental Education. This integration allowed for the establishment of a collaborative and dynamic network for the exchange of knowledge among students and individuals interested in the subject.

At the same time, another contribution of the blog, based on the students' perception, is digital literacy, which, despite not presenting many difficulties in handling the platform, challenged them to use DICT critically, creatively, and effectively. In this context, the students were encouraged to create and publish materials about household solid waste, which entails learning about the subject matter and developing digital literacy skills.

Despite the study's focus being on solid waste, the use of the blog as an intervention tool provided an opportunity to develop digital skills in the students. It can be stated that this media resource is an expression of digital culture, as it encompasses principles of interaction, collaboration, and information dissemination. Additionally, creating blog posts required selecting and producing educational materials using various DICT. The aim was to enhance digital navigation skills and critically evaluate the information available through these channels. Thus, the process of creating the blog about

household solid waste demanded technological skills from the students, enabling them to engage with digital media, create content, and expand their voice and active participation in the digital sphere.

In light of the foregoing, the results indicate that it's possible to propose educational activities based on the integration of DICT. The blog, although the digital technology used in this study, is just one alternative among several available. This diversity expands the possibilities for the intentional and targeted use of DICT in the classroom, allowing for the discussion of aspects of students' lived reality, as proposed in this research.

There was, therefore, a concise objective and a practice oriented towards attitudinal change in students regarding the issue of household solid waste, prompting them towards responsible and sensitive behaviors. Furthermore, it sparked connections between different concepts, broadened students' perceptions, and enabled them to observe the local situation. This process led to a deeper understanding of the implications of household solid waste in their community and inspired them towards social transformation in the face of this issue. It is hoped that this study can contribute to the literature on environmental education, specifically concerning household solid waste, and the appropriate integration of DICT in educational settings, while also inspiring further research to explore new approaches to using DICT in classroom contexts.

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AUTHORSHIP CONTRIBUTION STATEMENT

GEB conducted data collection, analysis, and research writing. PTCL was responsible for providing guidance, corrections, and collaborating on the analyses.

DATA AVAILABILITY STATEMENT

The collected data will be made available upon prior request to the corresponding author (GEB).

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