ACTIO: Docência em Ciências
ISSN: 2525-8923

http://periodicos.utfpr.edu.br/actio

Media scientific literacy and health education: analysis of podcasts produced by pre-service teachers

Rafaela Ferreira dos Santos
rafiferreira22@gmail.com
orcid.org/0000-0003-1722-1822
Federal University of Rio de Janeiro (UFRJ), Rio de Janeiro, Rio de Janeiro, Brazil

Laís Gonçalves Berruezo
laisgberruezo@gmail.com
orcid.org/0000-0002-0615-3388
Federal University of Rio de Janeiro (UFRJ), Rio de Janeiro, Rio de Janeiro, Brazil

Taís Rabetti Giannella
taisrg@yahoo.com.br
orcid.org/0000-0001-9563-2964
Federal University of Rio de Janeiro (UFRJ), Rio de Janeiro, Rio de Janeiro, Brazil

ABSTRACT

This article focuses on the mobilization of media scientific literacy in pre-service teacher education through the production of podcasts about the relationships between climate change and dengue. It is motivated by the complexity of public health issues, increasingly intertwined with social, environmental, and media factors, requiring innovative educational approaches. Two podcasts and their self-assessments were analyzed, employing Bardin's content analysis in dialogue with the theoretical framework of media scientific literacy, which unfolds into cultural, conceptual, civic, and creative categories. The cultural dimension revealed the recognition by pre-service teachers of the social mechanisms of scientific and media validation and their interconnections. From the conceptual perspective, there was an expansion in understanding dengue and climate, with the inclusion of political and social variables. The civic dimension reflected initiatives to address misinformation and the value of collectivity. The creative axis emphasized investigative practice and the development of engaging narratives aimed at dialogue with the public. The discussion indicates that, through podcast production, pre-service teachers exercise critical analysis, authorship, and social positioning, bringing scientific education closer to health education. It is concluded that such practice strengthens teacher education by integrating science, media, and society and enhances the role of future teachers as mediators of broader debates on health.

KEYWORDS: Health Education; Scientific Misinformation; Teacher Education; Media Production; Digital Culture.

Letramento científico midiático e educação em saúde: análise de podcasts produzidos por licenciandos

RESUMO

Este artigo visa analisar a contribuição da produção de podcasts sobre as inter-relações entre mudanças climáticas e dengue para a mobilização de letramento científico midiático (LeCiM) na formação inicial docente em ciências biológicas. Foram analisados dois podcasts e as autoavaliações correspondentes produzidas pelos licenciandos sobre a atividade, adotando-se a análise de conteúdo de Bardin em diálogo com as dimensões cultural, conceitual, cidadã e criativa do LeCiM, que constituíram quatro categorias analíticas. Na dimensão cultural, observamos o reconhecimento, pelos licenciandos, dos mecanismos sociais de validação científica e midiática e suas articulações. Sob o prisma conceitual, percebemos a ampliação da compreensão sobre dengue e clima, com integração de variáveis políticas e sociais. A dimensão cidadã refletiu iniciativas de enfrentamento à desinformação e valorização da coletividade. Já a dimensão criativa destacou o exercício investigativo e a criação de narrativas envolventes voltadas ao diálogo com o público. As discussões apontam que, ao produzir podcasts, os licenciandos exercitam análise crítica, autoria e posicionamento social, aproximando os campos da educação científica e educação em saúde. Conclui-se que tal prática fortalece a formação docente, integrando ciência, mídia e sociedade, e potencializando o papel do futuro professor como mediador de debates ampliados sobre saúde

PALAVRAS-CHAVE: Educação em Saúde; Desinformação Científica; Formação de Professores; Produção midiática; Cultura Digital.

INTRODUCTION

Climate change[1] constitutes one of the greatest contemporary challenges, with direct implications for health. Rising average temperatures, the intensification of extreme weather events, and ecosystem changes create favorable conditions for the proliferation of disease vectors, such as *Aedes aegypti*, the transmitter of dengue, chikungunya, and Zika virus (Lima-Camara, 2024). Dengue fever, in particular, has become a serious public health issue in Brazil, with recurring epidemics that overload the public healthcare system and affect populations unequally. These impacts are intensified in more vulnerable regions, where factors such as inadequate sanitation, unplanned urbanization, and social inequality increase exposure risks (Lima-Camara, 2024; Moura & Leite, 2023; Mohr & Schall, 1992).

This scenario makes explicit that health problems cannot be analyzed solely from a biomedical perspective, as often occurs, since they also involve social, environmental, and cultural dimensions (Lima-Camara, 2024). In this sense, health education emerges as a field that seeks to integrate these multiple dimensions, aiming at the education of individuals capable of understanding such determinants and acting collectively in defense of the right to health (Mohr & Schall, 1992; Moura & Leite, 2023; Westphal, 2006).

Regarding teacher education and teaching practice, there is extensive literature discussing the challenges of addressing health-related topics in curricula. Studies indicate that the topic is still frequently approached in a restricted manner, marked by a biologicist and prescriptive bias, which limits its articulation with social, cultural, and environmental dimensions (Mohr & Schall, 1992; Moura & Leite, 2023; Westphal, 2006). This limitation affects both curriculum organization and pedagogical practices, hindering future teachers from mobilizing health as a transversal axis of scientific education (Antunes & Fonseca, 2022). To overcome this scenario, scholars advocate the integration of science and health in teacher education through a critical and contextualized approach, exploring interfaces with citizenship, curriculum, and digital media (Struchiner & Giannella, 2016).

As pointed out by several authors, science education grounded in the Science, Technology, and Society (STS) perspective may play a strategic role in this discussion by fostering the construction of a broader understanding of health in science and health education (Schwingel, Dattein, & De Araújo, 2022; Struchiner & Giannella, 2016). By integrating reflections mobilized by the STS perspective into teacher education regarding the STS dimensions, this approach may prevent health problems from being treated in isolation, enabling their understanding through broader determinants (Adams & Nunes, 2023; Strieder & Kawamura, 2017). In the same direction, it becomes essential to consider the role of media in the circulation of information, since media directly influence how science and health are understood and appropriated by people (Höttecke & Allchin, 2020; De Oliveira, Pinheiro, Ortega, & Santana, 2025; Pezzo, 2018). When articulated with health education, this science education approach integrated with media education broadens educational possibilities, preparing future teachers to critically discuss collective issues in which science, health, and media are intertwined (Adams & Nunes, 2023; Pezzo, 2018; Strieder & Kawamura, 2017).

One of the current challenges of critical science education is the massive circulation of information in digital environments, often marked by imprecision,

silencing, and misinformation (Buckingham, 2023; Kellner & Share, 2019; Pereira & Santos, 2020). This scenario compromises a broader understanding of health issues, vaccine adherence, prevention practices, and related policies. This challenge is also associated with the crisis of trust and the circulation of conspiracy theories in digital environments, which weaken scientific authority in contexts of epistemic crisis (Höttecke & Allchin, 2020; Oreskes, 2019).

Given this scenario, the mobilization of Media Scientific Literacy (MSL) practices may favor educational processes that enhance: (i) a better understanding of science and media; (ii) a more contextualized reading of content, taking into account social, political, economic, and cultural factors; (iii) the mobilization of citizenship through awareness and encouragement of engagement actions; and (iv) the exploration of creative forms that expand possibilities for teaching, learning, and expression (Allchin, 2015; Pereira & Santos, 2020; 2022; Höttecke & Allchin, 2020; Osborne & Pimentel, 2023; Reid & Norris, 2016).

Deepening this perspective on science education implies recognizing the internal mechanisms underlying scientific activity, such as evidence production, peer review, and consensus building (Höttecke & Allchin, 2020; Merton, 1973; Oliveira & Epstein, 2009), in addition to the external dimensions that influence its development, such as social pressures, political timing, economic interests, and media disputes (Oliveira & Epstein, 2009; Pereira & Santos, 2020).

This movement toward recognizing science through both its internal and external mechanisms is related to the need for an expanded interpretation of educational content through contextualized teaching that incorporates political, social, cultural, and media dimensions (Adams & Nunes, 2023; Strieder & Kawamura, 2017; Pezzo, 2018). This approach demonstrates that issues such as climate change and dengue are not limited to biological phenomena, but rather require the use of scientific knowledge in dialogue with local and global contexts, whose perceptions are also influenced by media framings (Massarani, Costa, & Brotas, 2021).

Beyond contextualizing content, it becomes essential to foster processes of awareness capable of strengthening individuals in the face of the structural, communicational, and cultural determinants that permeate science and media (Buckingham, 2023; Kellner & Share, 2019; Höttecke & Allchin, 2020; Santos, 2007). Such strengthening opens paths for engagement, social participation, and collective intervention (Kellner & Share, 2019).

Another important development is the creative dimension, expressed in pedagogical strategies capable of integrating science, health, and media, such as podcast production (Aguiar & Antunes, 2023; Bodart & Silva, 2021; Scartezini & Arantes, 2023). By writing, planning, and recording podcasts, pre-service teachers reflect on science and health, deepen concepts in dialogue with the world, and exercise creativity that involves both investigating and articulating information as well as experimenting with communication formats and assuming the role of authors in the circulation of knowledge (Bodart & Silva, 2021).

As Freire (1996) highlights, communicating, dialoguing, and participating constitute pedagogical practices, which reinforces the relevance of this strategy in teacher education. For these actions to materialize, teachers must assume a questioning and guiding role, promoting conditions that encourage students

throughout their teaching-learning processes. The use of podcasts may favor this movement precisely because it enables different approaches: substitutive (replacing a class), supplementary (deepening knowledge, developing skills, and exploring new perspectives), and creative (when students actively produce knowledge and become leading actors of the teaching-learning process) (Crepaldi & Ferreira, 2022).

Thus, this article aims to analyze the contributions of the production of two podcasts by pre-service teachers on climate change, dengue, and their interrelationships to the mobilization of MSL in initial teacher education in biological sciences. In addition to the content presented in the podcasts, the self-assessment texts prepared by students, in which they reflected on the activity developed, were also analyzed.

METHODOLOGY

This study is part of a doctoral research project with a qualitative approach grounded in educational design research (EDR), a framework that guides both the development and analysis of pedagogical interventions in real educational contexts through iterative cycles that articulate theory and practice, aiming at the production of knowledge applicable to education (McKenney & Reeves, 2018). Within the scope of EDR, the study was organized into interrelated stages involving the identification and analysis of an educational problem in the context of initial teacher education, the development of an instructional design aimed at mobilizing MSL, the implementation of this design in a blended-learning teacher education course, and the production of design principles throughout the process in order to refine the proposal and construct theoretical understandings regarding the investigated practice. In this context, the general objective of the research was to investigate and develop, in collaboration with a professor from a blended-learning Biological Sciences teacher education program at a public university, an instructional design focused on mobilizing MSL practices.

The redesign was related to a course on topics concerning scientific activity, which was organized into eight classes: (I) Course Presentation; (II) Understanding Scientific Activity; (III) Scientific Communication and Diversity; (IV) Science in Debate: Climate Change; (V) Science Communication as Scientific Activity – Podcast Planning; (VI) Science Communication as Scientific Activity – Podcast Recording; (VII) Science Communication as Scientific Activity – Podcast Sharing; and (VIII) Make-up Class.

The eight classes were organized into three interdependent educational moments aimed at developing MSL practices. In the first moment, immersion (classes 2 and 3), students became familiar with the foundations of scientific activity, considering internal aspects, such as knowledge construction, modes of investigation, and communication among peers, as well as external aspects, such as social, ethical, and media contexts that influence and are influenced by science. In the second moment, deepening (class 4), pre-service teachers compared two media contents, analyzing the circulation of scientific knowledge about climate change and reflecting on the political, economic, and sociocultural interests that permeate both its production and dissemination. Finally, in the consolidation moment (classes 5,

6, and 7), students planned, recorded, and shared podcasts. A podcast writing and recording workshop was conducted to support this stage.

The podcast scripts created by students had to address socially relevant scientific topics related to climate change. Sixteen topics were made available, and each student or group was required to choose one and justify their choice.

Based on the selected topic, students prepared their scripts using an online editor and shared the links in a spreadsheet in order to receive comments from tutors and professors. Thirteen podcasts were produced. After reflective self-assessment and the suggested revisions, students recorded the episodes, which, once approved, were published on the course's digital board.

Participants were pre-service teachers enrolled in the course, offered in a blended-learning format at a public university. Students were at different stages of their initial education in biological sciences, ranging in age from 18 to 60 years. They came from different regions of the state of Rio de Janeiro, including Baixada Fluminense and municipalities in the countryside of the state, presenting diverse academic trajectories and educational experiences. Participants were involved in the proposed activities both in the virtual environment and during the synchronous meetings of the course.

In this article, the focus is on the analysis of two podcasts. One in monologue format: "Climate Change and Public Health: Pathways and Challenges" – A1, with a duration of 15 minutes and 43 seconds; and another in dialogue format: "Dengue and Climate Change: A Detailed Dive" – G1, with a duration of 17 minutes and 16 seconds. This analytical focus was chosen because these podcasts offered greater possibilities for articulating science and health.

The analysis of the podcasts and self-assessment texts was conducted through Bardin's (2016) thematic content analysis. According to the author, content analysis comprises three stages: (1) pre-analysis, involving text skimming and identification of initial patterns; (2) exploration, with the selection of units of analysis and articulation between data and research objectives; and (3) interpretation, in which the units are organized into analytical categories that enable new understandings of the phenomenon under study.

The selected units of analysis were presented in the text within quotation marks and indented in order to highlight the empirical excerpts supporting the analytical categories. Furthermore, thematic categorization was guided by the four dimensions of the MSL theoretical-methodological framework. MSL is understood as a social practice encompassing the ability to search for, analyze, respond to, produce, and share content and actions involving science in/through digital media. In this sense, the theoretical-methodological framework of MSL is organized into four dimensions (cultural, conceptual, civic, and creative), which guide both the analysis and the proposal of activities aimed at integrating science and media in teacher education.

1. Cultural dimension of science and media: this dimension reinforces the importance of understanding the internal and external aspects of science in order to achieve a comprehensive view of scientific activity. This includes understanding media and the interaction between scientific activity and media, as well as the impacts of this interaction on science.

2. Conceptual dimension of media scientific content: this dimension highlights the importance of understanding scientific concepts, as well as how these concepts are represented and communicated in media. In addition, it includes working with content through a contextualized approach.

3. Civic dimension of science in/through media: this dimension involves the use of science and media as means of promoting citizenship through pedagogical initiatives that encourage awareness and action.

4. Creative dimension of science in/through media: this dimension values the appropriation of media as a means of exploration and expression regarding issues related to science.

Thus, the four dimensions of MSL were adopted in the analysis as a priori categories, from which, *a posteriori,* subcategories were established for each dimension.

This research was approved by the Research Ethics Committee (Opinion 5,077,535) and is part of a doctoral dissertation from the graduate program of *Instituto Nutes de Educação em Ciências e Saúde* of *Universidade Federal do Rio de Janeiro*.

RESULTS AND DISCUSSION

The analysis was conducted based on the dimensions of the MSL theoretical framework, which served as *a priori* categories for organizing the data. This framework made it possible to identify, for instance, how pre-service teachers recognized mechanisms of production, validity, and circulation of science and media, composing the cultural dimension; how they mobilized scientific concepts and related dengue and climate change to political, economic, social, and media factors, characterizing the conceptual dimension; how they reflected on awareness and encouraged engagement practices linked to the civic dimension; and, finally, how they appropriated media creatively to investigate, express, and communicate ideas, composing the creative dimension.

CULTURAL DIMENSION OF SCIENCE AND MEDIA

Mechanisms of Scientific Production and Validity

In this subcategory, pre-service teachers recognize processes such as peer review, scientific consensus building, and testing protocols, perceiving science as a collective and continuously assessed practice.

> "It is important to emphasize that, in science, when we use the term 'scientific consensus,' it means that the majority of scientists specialized in a given subject agree on a particular theory, hypothesis, or conclusion based on the evidence currently available. This consensus is achieved through a rigorous peer-review process, in which other scientists carefully examine and assess the data, methods, and results of scientific studies." (A1)

> "Science does not work based on assumptions! When a scientist publishes the results of a study, that work has gone through several stages of review by other scientists in the field and has been tested many times." (G1)

Students demonstrate an understanding that scientific knowledge only acquires legitimacy when it undergoes continuous processes of collective verification. This perception aligns with what Merton (1973) describes as the principle of organized skepticism, according to which no proposition should be accepted without critical assessment by the community of specialists. Likewise, it dialogues with Oreskes (2019) by recognizing scientific consensus as an important indicator of reliability precisely because it results from successive tests and reviews. Similarly, Allchin (2015) draws attention to the fact that science does not correct itself automatically, but rather depends on these social mechanisms of critique and validity to sustain its credibility over time.

Furthermore, the excerpts concerning Takeda's dengue vaccine (TAK-003), better known by its commercial name Qdenga®, composed of live attenuated viruses based on dengue virus serotype 2 (dengue virus type 2 – DEN-2) and chimeric viruses of serotypes 1, 3, and 4 (dengue virus types 1, 3, and 4 – DEN-1, DEN-3, and DEN-4), point to the appreciation of the technical mechanisms structuring experimental validity, such as successive phases of laboratory testing, the use of clinical trials, and comparisons between experimental and control groups.

> "The control group is very important for comparing the data. If the group that received the vaccine presents better results than the group that received the placebo, it can be said that the vaccine is effective, as in the case of Qdenga, which showed 80.2% efficacy against the disease and more than 90% efficacy against hospitalization after the last dose." (A1)

> "For a vaccine to be approved for distribution, it goes through several stages of laboratory testing and is only tested on humans in the final phase." (G1)

This perspective reveals that students recognize that the reliability of science results not only from institutional debates but also from the protocols guiding evidence production. Such understanding aligns with Allchin's (2015) reflections, which emphasize the importance of considering how errors are identified and corrected in practice, even though these processes do not occur automatically or immediately and may take years or even decades. In this sense, students' perception indicates an understanding of the nature of science in which credibility also depends on the articulation between practices and social instances of assessment. This understanding is especially relevant for Health Education because it enables future teachers and citizens to recognize some of the criteria that make scientific knowledge reliable, as illustrated by the example of dengue vaccine development mentioned by students.

Sociocultural and Media Interfaces of Science

In this subcategory, statements by pre-service teachers suggesting recognition that scientific production is intrinsically linked to processes of media and cultural mediation are analyzed.

The excerpts below bring forth the idea that the same informational ecosystem that enables rapid access to scientific content also facilitates the dissemination of incorrect or distorted information:

> "The ease of access and the large amount of information constantly being broadcast to the public can become a problem, since not all information is reliable." (G1)

> "Given the current scenario, information is essential for dealing with everyday problems, and there is no doubt that information provided through media is frequently used for decision-making." (A1)

These statements indicate that pre-service teachers identify the coexistence of evidence-based information and unvalidated content within the media environment. This awareness dialogues with studies addressing the ambivalent role of media (Buckingham, 2023; Kellner & Share, 2019; Santos *et al*., 2025) and reinforces the notion that understanding science in the public sphere implies recognizing both its mechanisms of legitimation and the noise and distortions that emerge during circulation processes (Höttecke & Allchin, 2020; Pereira & Figuerôa, 2024; Santos *et al*., 2025).

The complexity of these interfaces is deepened when one pre-service teacher attributes a strategic character to misinformation:

> "Misinformation may also be intentional in order to divert public attention away from the issue, a tactic widely used by conspiratorial and denialist movements [...]." (A1)

Here, there is recognition that science communication does not occur in a neutral manner, but rather within a field permeated by symbolic disputes and specific interests. Such understanding aligns with the sociocultural approach to science, which considers that the production and dissemination of knowledge are embedded in political and economic contexts influencing its circulation and reception (Höttecke & Allchin, 2020; Pereira & Figuerôa, 2024), as observed in vaccine hesitancy driven by the anti-vaccine movement (De Oliveira *et al*., 2025).

In addition to issues related to information circulation, some pre-service teachers highlighted the presence of multiple actors involved in the production and application of scientific knowledge. Their statements reveal that science, especially in the field of health, is not limited to academia, but also involves governmental agencies, regulatory institutions, and local initiatives contributing to the confrontation of concrete problems.

> "The Federal Government, together with the Ministry of Health and the National Health Agency, established the Public Health Emergency Operations Center for Dengue and other Arboviruses – COE, which aims to provide a coordinated and efficient response to epidemiological situations related to dengue and other arboviruses throughout the country." (G1)

> "Projects such as AeTrapp can help local governments adopt the best strategy to combat the mosquito." (G1)

These statements suggest an approximation to the idea of science as a collective practice articulated among different institutions and social actors. On the one hand, the Emergency Operations Center (COE - *Centro de Operações de Emergências*) symbolizes the coordination of technical and political efforts to

provide rapid responses to epidemiological emergencies, demonstrating the interaction between science and public policy. On the other hand, the AeTrapp application, used in dengue mosquito surveillance, exemplifies community monitoring initiatives integrating local knowledge and contributing data to health management. Such diversity of actors dialogues with Latour's (2000) perspective by conceiving science as a "sociotechnical network" involving laboratories, governments, companies, and communities in interdependent processes of solution production. This recognition of the plurality of actors is essential in teacher education because it broadens future teachers' understanding of how scientific knowledge is constructed in real contexts and helps them articulate, in the classroom, the relationships between science, institutions, and social practices.

CONCEPTUAL DIMENSION OF MEDIA SCIENTIFIC CONTENT

Incorporation and Understanding of Scientific and Media Concepts

In this subcategory, excerpts are gathered in which pre-service teachers draw on scientific and media concepts to support their arguments. To do so, they present the transmitting agent and the nature of the disease, offering a description of the vector and the clinical manifestations of dengue.

> "Dengue — a viral disease transmitted mainly by infected female *Aedes aegypti* mosquitoes — when compared to January 2023, according to data from the Health Intelligence Center (CIS)." (A1)

> "The symptoms become concerning when severe and persistent abdominal pain, persistent vomiting, fluid accumulation, and mucosal bleeding are observed. In these cases, one should immediately seek a nearby healthcare unit, as it is likely that classic dengue has progressed to its most severe form, hemorrhagic dengue, which occurs when the platelets responsible for blood clotting are destroyed by the infection." (G1)

As observed in these excerpts, science learning is inseparable from learning scientific language (Da Cruz Pereira & Da Silva Ferrey, 2021). This indicates that the introduction of technical terminology and the approximation to scientific language contribute to communicating content in a comprehensible way, as pre-service teachers did by employing terms such as "arbovirus" and detailed clinical descriptions. In this sense, by presenting information about severe symptoms, clinical conditions, and contraindicated medications, pre-service teachers mobilize concepts that support decision-making based on scientific evidence, reinforcing the importance of scientific knowledge as a parameter for informed choices in the field of health.

Pre-service teachers also addressed concepts related to scientific practice, such as consensus, peer review, and control groups, as observed in the excerpts from A1 and G1 presented in the subcategory "Mechanisms of Scientific Production and Validity".

These explanations dialogue with Höttecke and Allchin (2020), who emphasize the importance of understanding not only the results of science but also its processes and methods, fostering a broader understanding of the nature of scientific activity.

Other excerpts incorporate environmental and ecological factors related to the proliferation of diseases.

> "The optimal temperature for mosquito reproduction is between 20 and 30 ºC." (G1)

> "The association between climate change and infectious diseases is not limited to dengue alone. Data from the Institute for Applied Economic Research (Ipea) have already shown that a 1% increase in deforested area in a municipality in the Amazon induces a 23% increase in malaria cases and between 8 and 9% in leishmaniasis cases." (A1).

These excerpts highlight essential concepts for understanding the relationship between environment and infectious diseases. The optimal reproduction temperature of *Aedes aegypti* demonstrates the influence of biological parameters on the vector's life cycle (Lima-Camara, 2024). Meanwhile, the association between deforestation and the increase in malaria and leishmaniasis cases reinforces evidence that environmental changes increase exposure to vectors and reservoirs (Lima-Camara, 2024). These concepts reveal the interdependence between biological, ecological, and climatic factors in the dynamics of infectious diseases (Lima-Camara, 2024).

Another example occurred when A1 demonstrated attention to communicational aspects related to the circulation of health information by stating that "misinformation may also be intentional in order to divert public attention away from the issue, a tactic widely used by conspiratorial and denialist movements." Here, pre-service teachers mobilize the concept of misinformation insofar as it is understood not as a simple error, but as an intentional practice interfering with the circulation of health-related content, constituting a relevant phenomenon for understanding the relationship between science, media, and society (Höttecke & Allchin, 2020; Pereira & Santos, 2020).

Overall, the analyzed excerpts highlight a movement toward the appropriation of scientific and media language. This appropriation is revealed not only through contact with technical terms, but also through the possibility of attributing meanings and establishing relationships between concepts and contexts in reading and communication practices.

Relationship Between Podcast Topics and Political, Economic, Social, Cultural, and Media Elements

In this subcategory, it is observed that pre-service teachers broaden their explanations by connecting dengue and climate change to different dimensions of social life.

A1 demonstrates the perception that the impacts of climate change and diseases affect populations under different socioeconomic conditions unequally.

> "Although the entire world population is exposed to such problems, they do not affect everyone in the same way. Underdeveloped and developing countries suffer the most from the advent of global warming. Therefore, the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) addresses more than merely an environmental issue by emphasizing the relationship between changes in climate patterns and their effects on people's lives, especially among poorer populations." (A1)

The excerpt explicitly mobilizes concepts such as global warming and changes in climate patterns, and indirectly activates the idea of vulnerability and climate justice by highlighting that developing countries and poorer populations suffer more intense impacts. This articulation approximates the notion of climate risk addressed by the Intergovernmental Panel on Climate Change (IPCC), which integrates hazard, exposure, and vulnerability, demonstrating that the pre-service teachers' understanding goes beyond the traditional environmental dimension and incorporates social inequalities into the scientific debate, aligning with a critical perspective.

A1 also highlights the problem of the circulation of false information and its effects on public understanding of health-related issues.

> "During the COVID-19 pandemic, for instance, many unfounded accusations were made, including by healthcare professionals. Claims that vaccines were toxic, caused immunological problems, among others. Not coincidentally, vaccine reversal and detox courses later began to be sold." (A1)

This excerpt highlights that misinformation during the pandemic did not originate only from laypeople, but also from healthcare professionals, which broadened its circulation and favored mistaken interpretations. Claims that vaccines were toxic mobilize distorted concepts of immunization, contributing to vaccine hesitancy and declining vaccination coverage rates, a phenomenon already discussed in the literature as a problem involving scientific, political, and cultural dimensions (De Oliveira *et al*., 2025). The promotion of "vaccine reversal" and "vaccine detox" courses exemplifies how misinformation discourses may be transformed into commodities, connecting economic and media aspects to the public understanding of science (Porto; Oliveira & Rosa, 2018). Thus, pre-service teachers articulate concepts concerning health, information, and media circulation to understand misinformation as a complex process that goes beyond biomedical explanations and involves multiple determinants.

In other statements, direct references to public policies and the role of the State in confronting dengue and climate change gain prominence.

> "Regarding climate change, Brazil has a National Plan. Among its measures are reducing Amazon deforestation and increasing forest plantations, among others. However, the most recent available data on greenhouse gas emissions by sector have not been updated since 2014, thus limiting transparency and undermining the seriousness of the issue." (A1)

> "The Federal Government [...] – COE, which aims to provide a coordinated and efficient response to epidemiological situations related to dengue and other arboviruses throughout the country." (G1)

> "Here in Rio de Janeiro, the city government is carrying out several actions to combat the mosquito, such as household visits for guidance and identification of mosquito breeding sites, in addition to having created a website to inform citizens, *Rio sem Dengue*, where, besides information about symptoms and vaccination, people can find locations for treatment in suspected cases." (G1)

The presence of these references reveals how pre-service teachers recognize the centrality of State action in managing socioenvironmental problems. Azevedo, Pelicioni, and Westphal (2012) emphasize health as a collective and intersectoral responsibility. When mobilized by pre-service teachers, this same understanding

reinforces the importance of educating teachers capable of presenting science as an activity connected to political, social, and institutional decisions.

There are also excerpts highlighting the presence of international organizations and news media outlets as sources of information and legitimization of scientific knowledge.

> "At the global level, we can rely on the Pan American Health Organization (PAHO), of the World Health Organization (WHO), which provides advisory services and technical support not only to prevent but also to control dengue in target regions. This is in addition to clinical-epidemiological monitoring." (A1)

> "The CNN Brazil report entitled 'Climate change and deforestation contribute to the increase in dengue cases, study says' stated that rising temperatures, as a consequence of climate change and deforestation, are directly related to the increase in dengue cases in the country." (G1)

These excerpts reveal the mobilization of scientific concepts related to dengue epidemiology and the effects of climate change and deforestation on health-related issues. By mentioning the Pan American Health Organization/World Health Organization, pre-services teacher activate the political and institutional dimension of science, recognizing the role of multilateral organizations in disease monitoring and control. Meanwhile, the reference to the report linking climate, deforestation, and the increase in dengue cases indicates an understanding that environmental and social processes directly influence epidemiological dynamics. This articulation aligns with the perspective of IPCC and Brazilian studies (Lima-Camara, 2024), which point out how environmental determinants increase vulnerability to arboviruses.

Overall, it is observed that pre-service teachers not only draw upon scientific concepts involving climate, health, and environment, but also articulate them with political, economic, and institutional dimensions. This movement reveals an expanded understanding of phenomena situated within concrete social contexts and indicates the educational potential of practices encouraging critical reading of complex problems such as climate change and dengue.

CIVIC DIMENSION OF SCIENCE IN/THROUGH MEDIA

Awareness

In this subcategory, statements stand out that reveal awareness regarding the circulation of information, the understanding of climate change as a collective problem, and the recognition of social inequalities.

A1 observes that media coverage of the increase in dengue cases adopts a restricted approach by failing to consider climate change, demonstrating awareness of how certain choices limit understanding of the problem.

> "However, the main news sources have scarcely associated this increase with the issue of climate change, which simplifies the discussion and limits reflection on the topic." (A1)

This position reveals a process of awareness, as it highlights the ability to recognize that the framing of information influences public understanding of health and environmental issues (Massarani *et al*., 2021). As Buckingham (2023) and Kellner and Share (2019) emphasize, identifying gaps and reductionism in narratives is a decisive step toward a critical stance, especially when conflicts of interest may be involved in determining what is emphasized or silenced, something recurrent in science and health topics involving economic and political impacts (Oreskes, 2019; Reis, 2025; Santos, 2007).

The same concern regarding information circulation appears in another statement emphasizing the importance of scientific evidence:

> "However, the ease of access and the large amount of information constantly being broadcast to the public can become a problem, since not all information is reliable. [...] To avoid this, it is crucial that the information shared is always based on proven scientific evidence." (G1)

In G1, the emphasis lies on awareness regarding the circulation of health information, highlighting the need for guidance to be grounded in scientific evidence. Such perception aligns with studies indicating the relevance of educating readers capable of assessing the reliability of scientific information in media contexts (Buckingham, 2023; Höttecke & Allchin, 2020; Kellner & Share, 2019; Pereira & Santos, 2020).

Other examples of awareness emerge when pre-service teachers emphasize that overcoming climate impacts and their consequences requires collective action.

> "It is therefore necessary to establish a connection between climate change and public health, since little is discussed about this relationship. The planet is overheating. Impacts are inevitable if no containment measures are taken — which requires international cooperation, governmental and corporate efforts — a major challenge, since their interests often conflict with the common good." (A1)

In A1's podcast, awareness appears in the recognition that climate change directly affects public health and that overcoming it requires coordinated collective efforts among different actors. Pre-service teachers highlight that international, governmental, and corporate cooperation is necessary, but often strained by private interests that oppose the common good. This perception reveals an understanding that confronting socioenvironmental problems demands decisions extending beyond the individual sphere, situating them within the field of collective responsibilities (Adam & Nunes, 2023; Conrado & Nunes-Neto, 2018; Santos, 2007), a perspective also shared by authors in the field of Health Education (Mohr & Schall, 1992; Moura & Leite, 2023; Westphal, 2006).

Finally, recognition also emerges regarding the inequalities shaping the distribution of environmental risks:

> "Wow… and the worst part is that these problems end up affecting poorer regions more intensely, right? Especially regarding the consequences of heavy rainfall and flooding. Unfortunately, environmental injustice is a Brazilian reality. And this contributes greatly to creating a perfect scenario for dengue!" (G1)

This observation echoes Acselrad (2004), who defines environmental injustice as the unequal distribution of environmental risks and damages in societies marked by economic and political inequality. In the field of science education, incorporating this debate is essential because, as argued by Moura and Leite (2023) and Westphal (2006), understanding health in a broader sense implies considering social and environmental factors as constitutive parts of illness processes.

Engagement in Social Practices and Actions

In this subcategory, statements are gathered in which pre-service teachers encourage individual and collective action in response to the challenges imposed by climate change and related diseases. These manifestations indicate an active stance in which science and media are understood not merely as explanations of phenomena, but also as resources for guiding social practices, public policies, and community strategies.

A first example appears when student A1 invites the audience to adopt an active stance, proposing concrete actions ranging from information sharing to community mobilization:

> "So, to you listening to me, let us together adopt the role of agents of change in digital media. Let us plant the seed of scientific knowledge. Here are some suggestions and examples for you to engage: share educational information about dengue, its symptoms, transmission, prevention, and vaccines. Mobilize the community: participate in Facebook groups, follow profiles dedicated to the issue on Instagram and Twitter. When sharing, use hashtags. Tag friends in posts. Seek profiles that point to the current dengue epidemic as a consequence of rising temperatures and rainfall. Promote preventive actions in different spaces (at home, at your school, at your religious institution, if you belong to one), emphasizing effective practices such as eliminating containers with standing water, using repellents and window screens, and organizing community clean-up efforts." (A1)

This statement calls the public toward collective engagement practices, aligning with the conception of Health Education as a process of shared knowledge construction and strengthening of citizenship (Mohr & Schall, 1992; Moura & Leite, 2023; Westphal, 2006). In the same direction, Buss and Pellegrini Filho (2007) emphasize that health promotion implies social co-responsibility and requires the participation of multiple actors, broadening the perspective beyond the school environment. Complementarily, Leonel, Gomes, Koerich, and Schwertl (2019) show that digital media, when integrated into educational practices, can enhance both the critical circulation of information and community mobilization regarding collective problems. Thus, the actions suggested by students, ranging from information dissemination to organizing collective clean-up campaigns, constitute an educational pathway in which science, education, and citizenship are articulated in the construction of a culture of participation in health, essential for confronting challenges such as dengue and climate change.

Similarly, G1's statements also contain appeals for social and political involvement, such as when preventive measures are related to the right to demand public policies:

> "The most important thing is combating mosquito breeding sites. [...] And, of course, as citizens, we must demand measures from governments and companies to mitigate climate change, as well as investment in public health policies." (G1)

This position dialogues with debates on environmental justice (Acselrad, 2004) by recognizing that overcoming health problems requires both local initiatives and structural transformations. In the field of teacher education, this means understanding that preparing Science teachers involves not only mastery of concepts and the ability to problematize situations of inequality, but also the capacity to articulate scientific knowledge with social struggles for dignified living conditions.

In G1's podcast, projects and initiatives seeking to directly involve the population are also mentioned, such as campaigns and participatory monitoring actions:

> "But returning to doing our part… Have you ever heard about the 10 Minutes Against *Aedes* Project? This project is supported by Fiocruz researchers." (G1)

> "So, everyone, besides promoting these projects, we can contribute by sharing reliable information about the topic on social media! We can also participate in online debates and discussions about climate change and health. A really interesting initiative is the AeTrapp Project, which aims to engage the population in monitoring *Aedes* mosquito populations." (G1)

These excerpts highlight different forms of social engagement, but only one of them constitutes citizen science. While the 10 Minutes Against *Aedes* Project is an awareness campaign, AeTrapp is an example of citizen science because it involves residents in monitoring mosquito populations and submitting data that may be used by researchers and public managers. By including this type of initiative in their script, pre-service teachers signal an initial approximation to the idea that science may also be carried out with society's participation, and not only by specialists in academic environments (Albagli, 2025). This movement is relevant in teacher education because it opens possibilities for thinking about pedagogical practices that bring science, community, and school closer together, strengthening critical engagement around socioenvironmental and health-related problem (Albagli, 2025).

Overall, it is observed that pre-service teachers not only recognize inequalities, but also emphasize the importance of collective action and the circulation of reliable information as part of confronting socioenvironmental problems. This movement indicates the construction of a critical stance that understands science, health, and environment in articulation with political, social, and media dimensions, reinforcing the educational potential of practices that bring science education closer to public debates on issues such as dengue and climate change.

CREATIVE DIMENSION OF SCIENCE IN/THROUGH MEDIA

Exploration

In this subcategory, excerpts are gathered in which pre-service teachers describe how the podcast development process mobilized research, study, and interdisciplinary articulation. The statements reveal that students engaged in different stages of production, involving the appropriation of scientific concepts, the selection of reliable sources, reflection on the best ways to communicate content, and concern with conveying relevant information to the audience. In addition, throughout the analysis, the quantity and types of sources consulted are also

presented in order to highlight the exercise of actively searching for different languages and formats for research.

In A1's podcast, it is possible to observe how the research conducted to support the script led pre-service teachers to new conceptual discoveries, enabling a deeper understanding of the relationship between climate change and health. This movement was supported by a broad set of 27 references, especially classical books, scientific articles, institutional reports, and journalistic news, which gave the podcast a more reflective and scientifically authoritative character.

> "The research for this work helped me better understand the relationship between climate change and health, something I had not previously stopped to reflect deeply upon." (A1)

This recognition reveals that the act of researching and writing for the podcast constituted an opportunity for contextualized learning. Working with socially relevant topics provides powerful educational experiences (Adam & Nunes, 2023; Pezzo, 2018), which, when associated with media production practices such as podcasting, can broaden the understanding of complex phenomena and develop sensitivity toward pedagogical mediation (Bodart & Silva, 2021; Scartezini & Arantes, 2023).

The creative process is also expressed in the curation of sources, in which the selection of updated materials appears as a relevant part of podcast construction. In the case of G1, this curation mobilized 22 references, prioritizing scientific articles, Fiocruz materials, and educational videos, highlighting an approach more oriented toward lay and young audiences:

> "We learned a lot during the construction of the podcast; we had to search for articles, reports, and updated data to support our statements." (G1)

This excerpt suggests that podcast production mobilized specific skills, such as critical assessment of information and the incorporation of multiple languages (Buckingham, 2023; Leonel *et al*., 2019). By conducting this search, the group exercised not only the appropriation of content, but also the responsibility of choosing what would be communicated, a central aspect of teacher education in a context permeated by misinformation. Such skills highlight the potential of media production practices as pedagogical resources because they allow pre-service teachers to develop authorship, exercise communicative sensitivity, and integrate conceptual knowledge with expressive strategies (Bodart & Silva, 2021; Scartezini & Arantes, 2023).

Pre-service teachers also highlighted the challenge of writing the scripts, pointing out that the process required both extensive study and the articulation of different areas of knowledge. At this stage, the statements indicate a concern with going beyond the mere description of content, seeking to establish broader connections between science, health, and society.

> "It was a great challenge to prepare this script. First, because I had to study the topic extensively, relating it to different areas of knowledge, and then think about how to articulate this information beyond academic content." (A1)

> "We realized that, beyond talking about dengue itself, it was necessary to address its relationship with other factors, such as climate change, basic sanitation, and social inequalities." (G1)

These statements reveal that the writing process involved selecting information, structuring arguments, and articulating interdisciplinary knowledge, requiring students to engage in a movement of translating scientific discourse into other contexts. This exercise points to the importance of educational practices that encourage the integration of knowledge and the ability to relate academic knowledge to concrete social situations. As highlighted by Adam and Nunes (2023) and Pezzo (2018), science teacher education is strengthened when it promotes experiences articulating conceptual understanding and meaning-making in broader contexts, as occurred in this exercise involving dengue and climate change.

Expression

In this subcategory, pre-service teachers present statements demonstrating that the process was not limited to studying content, but also involved experimenting with forms of expression capable of making science understandable, interesting, and dialogical for different audiences. One of the first aspects highlighted by students is the need to translate technical terms for lay audiences, seeking to bring science closer to social reality:

> "The idea of bringing everyday examples was precisely so that listeners could identify with them and better understand the impact of climate change on health." (A1)

> "Developing the podcast allowed me to practice accessible and creative language, thinking about how to transform technical terms into something closer to the listener." (A1)

At the end of the episode, they also suggested further learning materials to listeners, such as books, science communication channels, and widely circulated news outlets (CNN, BBC, *O Globo*), lending support to their statements and broadening dialogue with well-known communication media. In this movement, pre-service teachers exercise language as pedagogical mediation, bringing scientific concepts closer to the audience's everyday experiences, in line with the Freirean perspective that dialogue must begin from the concrete reality of individuals (Freire, 1996). Furthermore, the potential of science communication practices as an educational exercise for pre-service teachers can also be observed (Almeida, 2024).

Beyond language itself, students also highlighted the work involved in scripting the podcast, showing that creativity extends to narrative organization and authorial leading role:

> "The scripting process made us think about how to organize the dialogue so that it would be clear, dynamic, and engaging for listeners." (G1)

In the case of G1, this emphasis was accompanied by recommendations to listeners of supporting multimedia materials, such as educational videos, reports, and the Fiocruz e-book, reinforcing the intention to use easily understandable language for different audiences. These statements indicate that podcast production was also an exercise in creative expression, in which pre-service teachers needed to plan the narrative, select communication strategies, and experiment with ways of presenting scientific knowledge in an engaging manner. In this movement, the creative dimension is articulated not only through the structuring

of discourse, but also through the exercise of authorship, since the act of planning and deciding how to communicate content positions students as active subjects in the production and circulation of knowledge (Rehfeldt & Silva, 2019; Crepaldi & Ferreira, 2022).

Finally, G1 highlights the experience of assuming a new communicative role, moving beyond the position of students and emphasizing student leading role:

> "It was interesting to experience the role of communicators, not only of students, while thinking about the impact of what we were saying." (G1)

This shift in the role of pre-service teachers, from a passive subject to the leading actor of their own teaching-learning process, reveals how media can expand spaces for action in initial teacher education (Bodart & Silva, 2021; Scartezini & Arantes, 2023), enabling future teachers to test strategies of authorship, experience social responsibilities, and strengthen Health Education practices.

Regarding the source materials used in the production of the podcast content, it is worth emphasizing that the differences between A1's and G1's podcasts indicate that source selection, in addition to supporting content, also reflects distinct creative styles in podcast construction — that is, in how expression manifests itself. While A1 privileged sources associated with scientific authority, G1 sought accessible and popular multimedia materials, both expanding the possibilities for dialogue with different audiences.

Despite the advances observed, some limitations can also be identified in the analyzed educational process. Not all aspects of MSL were mobilized in a balanced manner, with greater emphasis placed on certain elements, such as conceptual understanding and authorial production, to the detriment of more systematic deepening regarding the dynamics of circulation and validity of scientific knowledge in media. Furthermore, although podcast production favored the articulation between science, health, and social context, the data do not allow us to affirm how these learnings would be sustained in other teaching contexts. Added to this is the heterogeneous participation of students, since, as this was an elective course, different levels of engagement were observed throughout the activities, which may have influenced both the depth of discussions and the development of media productions, constituting a relevant element for interpreting the results. From an operational perspective, podcast production also involved challenges, such as selecting and validating sources, adapting scientific language for different audiences, and meeting the technical demands related to recording and editing episodes. These aspects indicate the need for future investigations capable of further deepening both the limitations and the potentialities of using media production practices in initial teacher education.

FINAL CONSIDERATIONS

This article analyzed two podcasts produced by pre-service teachers in Biological Sciences about the interrelationships between climate change and dengue. The objective was to understand how this activity mobilized MSL practices and what contributions emerged for teacher education at the interface between science, health, and media.

In the cultural dimension, students recognized mechanisms of scientific production and validity, such as peer review and consensus, highlighting their importance for scientific credibility. They also identified disputes and mediations permeating the circulation of information in media. In the conceptual dimension, they mobilized central notions about dengue and climate change, relating them to social and political factors. In the civic dimension, they demonstrated awareness regarding the collective impacts of these phenomena and the need for cooperation and prevention. Finally, the creative dimension involved the use of multiple sources and efforts to communicate scientific content in an accessible and contextualized way, revealing authorship and sensitivity in translating scientific language.

These results indicate that working with the four dimensions favored the integration between science, health, and society, stimulating reflective learning. This articulation became concrete through podcast production, which brought science education closer to health education. By relating biological concepts to prevention practices, public policies, and structural inequalities, students recognized health as a collective right and understood that confronting diseases requires considering environmental, social, and economic determinants. Such integration demonstrates that science teaching can educate individuals capable of interpreting health problems in light of environmental and social issues, articulating scientific knowledge and citizenship.

It is concluded that podcasts were configured as practices of critical authorship integrating science, health, and media, strengthening pedagogical mediation in the face of challenges related to communication, misinformation, and social engagement. This experience points to powerful possibilities for articulating science education and health education in a critical, contextualized, and socially committed manner.

NOTES

1. Article translated by: Letícia Belasco

BIBLIOGRAPHIC REFERENCES

Acselrad, H. (2004). Justiça ambiental – ação coletiva e estratégias argumentativas. In Acselrad, H., Herculano, S., & Pádua, J. A. (Org.). *Justiça ambiental e cidadania*. Rio de Janeiro: Relume Dumará.

Adams, F. W., & Nunes, S. M. T. (2023). A vivência da abordagem de ensino CTS na formação inicial de professores de química. *Revista Tecnologia e Sociedade*, 19(56), 41-57.

Aguiar, C. K., & Antunes, E. P. (2023). Podcast como ferramenta para alfabetização científica e tecnológica no ensino da química no novo ensino médio. *ACTIO: Docência em Ciências*, *8*(3), 1-20.

Allchin, D. (2015). Correcting the "self-correcting" mythos of science. *Filosofia e História da Biologia*, 10(1), 19-35.

Almeida, J. V. V., & Moreno-Rodríguez, A. S. (2024). Divulgação científica nas redes sociais digitais: experiências e implicações para a formação de licenciandos em biologia. *Investigações em Ensino de Ciências*, 29(2), 460-478.

Antunes, Á. L. S., & Fonseca, C. V. (2022). Educação permanente em saúde e educação em ciências: articulações envolvendo processos de formação. *# Tear: Revista de Educação, Ciência e Tecnologia*, 11(1).

Struchiner, M., & Giannella, T. (2016). Com-viver, com-ciência e cidadania: Uma pesquisa baseada em design integrando a temática da saúde e o uso de tecnologias digitais de informação e comunicação na escola. *Revista E-curriculum*, *14*(3), 942-969.

Ferreira dos Santos, R., Gonçalves Berruezo, L., Rodrigues de Brito, S., & Giannella, T. R. (2025). Por uma leitura crítica sobre a ciência nas/com as mídias na formação inicial de professores de ciências biológicas: Desafios percebidos por uma docente universitária. *Perspectiva, 43*(1).

Albagli, S. (2025). Ciência cidadã: conceitos e práticas. *Ciência e Cultura*, 77(1), 27-31.

Azevedo, E., Pelicioni, M. C. F., & Westphal, M. F. (2012). Práticas intersetoriais nas políticas públicas de promoção de saúde. *Physis: Revista de Saúde Coletiva*, 22, 1333-1356.

Bardin, L. (2016). *Análise de conteúdo*. São Paulo: Edições 70.

Bodart, C. N., & Silva, Z. P. S. (2021). Podcast como potencial recurso didático para a prática e a formação docente. *Revista Tempos e Espaços em Educação*, 14(33), 1-18.

Buckingham, D. (2023). *Manifesto pela educação midiática*. São Paulo: Edições Sesc SP.

Buss, P. M., & Pellegrini Filho, A. (2007). A saúde e seus determinantes sociais. *Physis: revista de saúde coletiva*, 17, 77-93.

Conrado, D. N., & Nunes-Neto, N. (Org.). (2018). *Questões sociocientíficas: fundamentos, propostas de ensino e perspectivas para ações sociopolíticas*. Salvador: EDUFA. https://doi.org/10.7476/9788523220174

Crepaldi, T. A. A. T. S., & Ferreira, S. H. D. (2022). As possibilidades do uso de podcast no ensino superior: uma breve revisão. *Pesquisa e Debate em Educação*, 12(2), 1-e36113.

Da Cruz Pereira, A. A., & Da Silva Ferry, A. (2021). Aspectos da linguagem científica e da linguagem cotidiana em produções textuais de estudantes de química: as vozes verbais e as metáforas gramaticais. *Scientia Naturalis*, 3(2).

De Oliveira, I. M., Pinheiro, R., Ortega, F., & Santana, E. S. (2025). Elementos de desinformação na percepção pública sobre a vacina contra a dengue no Brasil: uma análise de comentários em mídias sociais. *Cadernos de Saúde Pública*, 41(3), e00097124.

Freire, P. (1996). *Pedagogia da autonomia: saberes necessários à prática educativa*. São Paulo: Paz e Terra.

Höttecke, D., & Allchin, D. (2020). Reconceptualizing nature-of-science education in the age of social media. *Science Education*, 104(4), 641-666.

Kellner, D., & Share, J. (2019). *The critical media literacy guide: Engaging media and transforming education* (Vol. 2). Brill.

Latour, B. (2000). *Ciência em ação: como seguir cientistas e engenheiros sociedade afora*. São Paulo: Unesp.

Leonel, A. A., Gomes, N., Koerich, V., & Schwertl, S. L. (2019). A formação de professores na perspectiva da mídia educação. *Revista ENCITEC*, 9(1), 15-30.

Lima-Camara, T. N. (2024). A dengue é produto do meio: uma abordagem sobre os impactos do ambiente no mosquito Aedes aegypti e nos casos da doença. *Revista Brasileira de Epidemiologia*, 27, e240048.

Massarani, L., Costa, M. C. R., & Brotas, A. (2021). Enquadramentos e desinformação sobre vacina contra COVID-19 no YouTube: Embaralhamentos entre ciência e negacionismo. *Revista Mídia e Cotidiano*, 15(3), 73-–100.

McKenney, S., & Reeves, T. C. (2018). *Conducting educational design research*. Routledge.

Merton, R. K. (1973). *The sociology of science: Theoretical and empirical investigations*. University of Chicago Press.

Mohr, A., & Schall, V. T. (1992). Rumos da educação em saúde no Brasil e sua relação com a educação ambiental. *Cadernos de Saúde Pública*, *8*, 199-203.

Moura, F. N. de S., & Leite, R. C. M. (2023). Conceito e percurso histórico da educação em saúde no Brasil. *Ensino, Saúde e Ambiente*, 15(3), 560–578.

Oliveira, J. A. D., & Epstein, I. (2009). Tempo, ciência e consenso: os diferentes tempos que envolvem a pesquisa científica, a decisão política e a opinião pública. *Interface-Comunicação, Saúde, Educação*, 13, 423-433.

Osborne, J., & Pimentel, D. (2023). Science education in an age of misinformation. *Science Education*, 107(3), 553-571.

Pereira, A. A. G., & Dos Santos, C. A. (2020). Desinformação e negacionismo no ensino de ciências: Sugestão de conhecimentos para se desenvolver uma alfabetização científica midiática. *Ensino & Multidisciplinaridade*, 6(2), 21-40.

Pereira, A. A. G., & Figueirôa, S. F. de M. (2024). Epistemologia social e desinformação científica: perspectivas para a educação em ciências. *Ensaio Pesquisa em Educação em Ciências* (Belo Horizonte), 26, e52480.

Pezzo, M. (2018). Cultura científica e cultura de mídia: relações possíveis (e necessárias) na prática de divulgação da ciência. *ComCiência e divulgação científica*, 87.

Porto, C., Oliveira, K. E., & Rosa, F. (2018). *Produção e difusão de ciência na cibercultura: narrativas em múltiplos olhares*. Ilhéus, BA: Editus.

Oreskes, N. (2019). *Why trust science?* Princeton University Press.

Rehfeldt, M. J. H., & Silva, M. S. da. (2019). Podcast como recurso de aprendizagem: um elo entre as mídias digitais, a aprendizagem significativa e o educar pela pesquisa. *Ensino em Re-Vista*, 26(SPE), 1171-1194.

Reid, G., & Norris, S. P. (2016). Scientific media education in the classroom and beyond: A research agenda for the next decade. *Cultural Studies of Science Education*, 11(1), 147-166.

Reis, P. (2025). Desafíos para la educación en ciencias y formación del profesorado en tiempos conturbados. In Mora Penagos, W. M. (Ed.). *Los escenarios actuales de crisis e incertidumbre: necesidades educativas en pensamiento crítico y diálogo de saberes.* Universidad Francisco José de Caldas-Editorial UD (pp. 97-110).

Santos, W. L. P. (2007). Educação científica na perspectiva de letramento como prática social: funções, princípios e desafios. *Revista Brasileira de Educação*, 12(36), 474-550.

Scartezini, B. C., & Arantes, A. R. (2023). Podcast como ferramenta pedagógica na formação inicial de licenciandos em Física. *Revista Docência do Ensino Superior*, 13, 1-15.

Strieder, R. B., & Kawamura, M. R. D. (2017). Educação CTS: Parâmetros e propósitos brasileiros. *Alexandria: Revista de Educação em Ciências e Tecnologia*, 10(1), 27-56. https://periodicos.ufsc.br/index.php/alexandria/article/view/1982-5153.2017v10n1p27

Schwingel, T. C. P. G., Dattein, R. W., & De Araújo, M. C. P. (2022). Educação em saúde e o enfoque ciência, tecnologia, sociedade e ambiente na educação profissional e tecnológica. *Vivências*, 18(36), 341–353.

Westphal. (2006). Promoção da saúde e prevenção de doenças. In Campos, G. W. S., Minayo, M. C. S., Akerman, M., Drumond Júnior, M., & Carvalho, I. M. (Org.). *Tratado de Saúde Coletiva: demarcando e ampliando horizontes* (pp. 635-667). Hucitec / Fiocruz.

Received: Oct. 22, 2025
Approved: Apr. 14, 2026
DOI: https://doi.org/10.3895/actio.v11n2.21041

How to cite:
Santos, R. F. dos, Berruezo, L. G. & Giannella, T. R. (2026). Media scientific literacy and health education: analysis of podcasts produced by pre-service teachers. ***ACTIO***, 11(2), 1-25. https://doi.org/10.3895/actio.v11n2.21041

Copyright: This article is licensed under the terms of the Creative Commons Attribution 4.0 International Licence.



Recebido: 22 out. 2025
Aprovado: 14 abr. 2026
DOI: https://doi.org/10.3895/actio.v11n2.21041

Como citar:
Santos, R. F. dos, Berruezo, L. G. & Giannella, T. R. (2026). Letramento científico midiático e educação em saúde: análise de podcasts produzidos por licenciandos. ***ACTIO***, 11(2), 1-25. https://doi.org/10.3895/actio.v11n2.21041

Direito autoral: Este artigo está licenciado sob os termos da Licença Creative Commons-Atribuição 4.0 Internacional.

