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EmRede, v.13. 2026

Interdisciplinarity as a strategy for cultural and technological resignification in teaching: an analysis of the MADE "Culture of the Northeast"

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DOI: http://doi.org/10.53628/emrede.v13i.1181 ISSN 2359-6082

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Abstract: The study analyzes the "Culture of the Northeast" MADE, linking school contents to regional culture and seeking to understand its potential as an interdisciplinary proposal mediated by digital technologies. The object of investigation is how Digital Authorial Educational Materials can contribute to a contextualized education rooted in identity. The qualitative and exploratory research revealed student engagement, student agency, and the integration of knowledge and local culture.

Keywords: Interdisciplinarity; Regional culture; Digital technologies.

A interdisciplinaridade como estratégia de ressignificação cultural e tecnológica no ensino: uma análise do MADE "Cultura do Nordeste"

Resumo: O estudo analisa o MADE "Cultura do Nordeste", articulando conteúdos escolares à cultura regional e buscando compreender seu potencial como proposta interdisciplinar mediada por tecnologias digitais. O objeto de investigação é como Materiais Autorais Digitais Educacionais podem contribuir para uma educação contextualizada e identitária. A pesquisa qualitativa e exploratória evidenciou engajamento, protagonismo discente e integração entre saberes e cultura local.

Palavras-chave: Interdisciplinaridade; Cultura regional; Tecnologias digitais.

La interdisciplinariedade como estrategia de resignificación cultural y tecnológica en la educación: um análisis de la MADE "Cultura del Noreste"

Resumen: El estudio analiza el MADE "Cultura del Nordeste", vinculando los contenidos escolares con la cultura regional y tratando de comprender su potencial como propuesta interdisciplinar mediada por las tecnologías digitales. Se investigó cómo los Materiales Educativos Digitales de Autor pueden contribuir a una educación contextualizada y centrada en la identidad. La investigación cualitativa y exploratoria puso de manifiesto el compromiso, el protagonismo de los alumnos y la integración entre los conocimientos y la cultura local.

Palabras clave: Interdisciplinariedad; Cultura regional; Tecnologías digitales.

Received on: **2026/06/15**

Accepted on: **2026/07/16**

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DOI: http://doi.org/10.53628/emrede.v13i.1181 ISSN 2359-6082

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1 INTRODUCTION

The integration of digital technologies in Brazilian education remains an ongoing process marked by challenges that extend beyond the mere introduction of technological tools into classrooms. Although digital devices are increasingly present in schools, their application is frequently limited to an instrumental approach, detached from innovative pedagogical practices (Valente, 2011). Within this context, a crucial question arises: how can technology be transformed into a vector for meaningful learning capable of engaging with students' sociocultural reality?

One potential response to this challenge lies in interdisciplinarity, which presents itself not only as a teaching methodology but also as an epistemological strategy for the resignification of knowledge. In this regard, Morin (2001) warns of the need to overcome disciplinary fragmentation, proposing an education that recognizes the complexity of the world and the interdependence among forms of knowledge. This perspective gains relevance in regional contexts, where the valorization of local culture can serve as an integrating axis between curricular content and students' identity (Silva; Almeida, 2022).

Within this context, the proposal to develop Digital Authorial Educational Materials (MADEs) stands out. These are understood as educational materials created by learners — whether teachers or students — using digital devices, with or without an internet connection. Such materials involve processes of creation, planning, execution, reflection, and assessment carried out individually or collectively, constituting pedagogical products that articulate teaching, learning, and assessment in an integrated and contextualized manner (Lima; Loureiro, 2016).

It is within this framework that the MADE "Culture of the Northeast" is situated, a pedagogical proposal that combines dance, biology, English, and digital media in a gamified approach. Initiatives such as this not only challenge the rigidity of traditional curricula but also reaffirm the potential of regional culture as a catalyst for student engagement. As Dias (2019) explains, interactive educational resources, when anchored in meaningful cultural references, can foster both student authorship and critical, contextualized learning.

The relevance of this discussion is supported by Brazilian educational guidelines. The Law of Directives and Bases of National Education (Brasil, 1996) establishes that teaching must connect to the world of work and social practice, while the National Curriculum Parameters (Brasil, 1997) highlight the importance of cultural diversity in the comprehensive education of students. More

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recently, the National Common Curricular Base (Brasil, 2017) reinforced the need to develop competencies that integrate knowledge, skills, and values, situating them within real-world contexts. Despite these guidelines, data from the Basic Education Assessment System (Brasil, 2019) reveal persistent inequalities in academic performance, many of which are linked to the disconnect between the content taught and the students' realities.

Given this scenario, this research seeks to answer: how can Digital Authorial Educational Materials (MADE) contribute to a more contextualized and identity-based education? Which elements of this resource foster student engagement and the integration between school and cultural knowledge? Finally, what relationships can be established among interdisciplinarity, technology, and the valorization of regional culture in the teaching-learning process? Based on these discussions, the present study aims to analyze the MADE "Culture of the Northeast," seeking to understand its potential as an interdisciplinary pedagogical proposal mediated by digital technologies.

By analyzing the MADE "Culture of the Northeast," this study not only dedicates itself to examining an innovative pedagogical resource but also discusses pathways for an education that recognizes Brazilian plurality. By starting from a concrete experience, this investigation distances itself from predominantly theoretical approaches, seeking to understand how the articulation among culture, curriculum, and digital media can resignify teaching practice.

In this context, it becomes necessary to present the theoretical foundations that support the articulation among interdisciplinarity, culture, and digital technologies within the educational environment. The research is organized into five sections: in addition to this introduction, the paper presents a theoretical framework on interdisciplinarity, local culture, and Technoteaching; describes the methodology used; discusses the results of the MADE analysis; and, finally, outlines the concluding remarks, pointing out contributions, limitations, and possibilities for future studies.

2 THEORETICAL AND PEDAGOGICAL FOUNDATIONS OF THE PROPOSAL

In the following section, themes such as interdisciplinarity, regional culture, digital technologies, authorial materials, and games in education will be discussed.

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2.1 Interdisciplinarity and regional culture in education

The fragmentation of knowledge imposed by traditional disciplinary structures has been questioned by various contemporary pedagogical approaches. Among these, interdisciplinarity stands out as a powerful and necessary alternative for constructing more meaningful and contextualized learning experiences.

In this sense, Morin (2001) argues that understanding the complexity of the world demands an education that transcends the boundaries of isolated fields of knowledge, fostering articulation among distinct areas and contributing to the comprehensive development of individuals. From this perspective, interdisciplinarity relates to the need to understand phenomena in their multiple dimensions, establishing connections across forms of knowledge as opposed to the fragmentation of knowledge. This understanding aligns closely with the perspective of Fazenda (2014), for whom interdisciplinarity presupposes dialogue and articulation among different fields of knowledge (Fazenda, 2014; Morin, 2001).

In the context of preservice teacher education and the production of Digital Authorial Educational Materials, Lima, Silva, and Loureiro (2023) also address interdisciplinarity through dialogue and interdependence among different areas of knowledge. In analyzing MADEs developed by preservice teachers, the authors highlight challenges and possibilities in articulating knowledge and overcoming fragmented practices.

In school practice, this movement manifests through pedagogical proposals that engage with students' realities and foster the convergence of different forms of knowledge. Fazenda (2014) emphasizes that interdisciplinary work demands collaboration among teachers, students, and diverse forms of knowledge, promoting an education that is more sensitive to sociocultural contexts. In this understanding, interdisciplinarity is not limited to the mere juxtaposition of content from different subjects, but presupposes dialogue and articulation among fields of knowledge, constituting an attitude toward the educational process (Fazenda, 2014). When coupled with the valorization of local culture, this approach gains even greater transformative power, as it allows students to recognize themselves within the taught content and strengthen their sense of belonging.

Silva and Almeida (2022) demonstrate that incorporating regional culture into the school curriculum contributes to student engagement by establishing connections between daily life and academic knowledge. From this perspective, regional culture is not restricted to the isolated

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presentation of traditions and cultural expressions, but encompasses knowledge, practices, and references constructed within the individuals' sociocultural contexts (Silva; Almeida, 2022). Its articulation with the curriculum fosters the recognition of experiences and knowledge tied to students' realities, bridging school knowledge and their cultural experiences. In the case of Brazilian Northeastern culture, whose richness manifests in diverse artistic expressions, popular knowledge, and traditions, its pedagogical potential expands, offering multiple possibilities for critical, creative, and interdisciplinary work.

Therefore, integrating interdisciplinarity and regional culture represents an advance toward a more inclusive, democratic school that is in tune with Brazilian diversity. As outlined by the National Common Curricular Base (Brasil, 2017), it is essential that teaching and learning consider students' prior knowledge and their sociocultural contexts, promoting an ethical, civic, and critical education. From this perspective, this integration configures itself as a relevant path toward the development of contextualized and formative pedagogical practices.

2.2 Digital Technologies, Authorial Materials, and Games in Education

When critically and purposefully integrated into the school environment, digital technologies become powerful allies in the teaching-learning process. Far beyond mere tools, they serve as mediators in the construction of knowledge, broadening access to information, diversifying languages, and promoting new forms of interaction between individuals and knowledge.

As Kenski (2012) argues, the pedagogical use of digital technologies must be guided by educational intentionality, fostering creativity, student agency, and inclusion. By breaking away from traditional and repetitive models, these tools enable dynamic, participatory practices aligned with students' realities, respecting their individualities and stimulating critical thinking. From this perspective, the integration of technologies in education is not limited to the adoption of digital resources, as it involves the reorganization of pedagogical practices and of the relationships established among teachers, students, and knowledge.

Furthermore, the advancement of connectivity and easier access to mobile devices create opportunities for personalized, active, and collaborative learning. Within this scenario, the role of the teacher is also transformed, shifting from a transmitter of content to a mediator of learning, responsible for planning, guiding, and promoting contextualized formative experiences. Prensky (2010) reinforces

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that technologies must be understood as extensions of human thought rather than mere auxiliary resources.

It is within this context that Technoteaching is situated, understood as a theoretical-methodological perspective that articulates teaching practice and digital technologies, considering the integration between teacher and student knowledge in the construction of interdisciplinary pedagogical practices (Lima; Loureiro, 2016). For Lima and Loureiro (2016), this perspective seeks to overcome the merely instrumental use of technologies, valuing processes of authorship, reflection, and the shared construction of knowledge. In this way, technology does not occupy a central position, but rather integrates pedagogical action based on the intentionalities and relationships established among the subjects involved in the educational process.

Among the pedagogical innovations driven by digital technologies, the production of authorial materials by teachers tailored to the specific needs of their students stands out. Within the scope of Technoteaching, this authorship can also be assumed by students, who actively participate in the processes of creation, planning, execution, reflection, and evaluation of digital materials (Lima; Loureiro, 2016). These materials, designed based on pedagogical criteria and real-world contexts, constitute valuable instruments for flexible, creative, and student-centered practices. Studies indicate that, although many teachers demonstrate openness to active methodologies and the use of technologies, challenges remain in continuing education and the critical appropriation of these resources (Goulart et al., 2024). In this sense, Cruz and Giacomazzo (2023) emphasize that teacher authorship is a key element for educational innovation that embraces diversity and promotes student agency.

When these materials take the form of digital games, the possibilities for student interaction with both content and the technologies involved in the educational process expand. From this perspective, Prensky (2010) underscores the need to integrate technologies into teaching practices in a manner consistent with students' ways of participating and learning. Thus, the contribution of a game to the educational process stems not merely from its playful or technological nature, but from the pedagogical intentionality that guides its structure and its alignment with learning objectives.

In this context, resources such as the MADE "Culture of the Northeast" exemplify the pedagogical potential of digital technologies by integrating interdisciplinarity, student authorship, and cultural valorization, materializing in practice the theoretical assumptions discussed by Kenski (2012) and Prensky (2010). Considering the principles of Technoteaching, the process of constructing the

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MADE shifts preservice teachers from the status of technology users to that of authors of digital educational materials, articulating knowledge from different fields into a shared pedagogical production (Lima; Loureiro, 2016).

Thus, understanding these theoretical foundations makes it possible to deepen the analysis of the pedagogical proposal of the MADE "Culture of the Northeast," discussing its potential to foster contextualized and formative learning, in addition to highlighting pathways for innovation in teaching practices. Additionally, this discussion contributes to reflecting on the role of digital technologies in building integrated, critical, and socially situated educational experiences.

3 METHODOLOGY

The present study employs a qualitative and exploratory approach of an interpretative nature, seeking to understand the meanings that emerge from the interaction between students and the Digital Authorial Educational Material (MADE) entitled "Culture of the Northeast." This methodological choice is particularly suitable for investigating educational phenomena that remain little explored and demand an in-depth analysis of the context and pedagogical practices involved (Gil, 2019).

The unit of analysis consists of the MADE "Culture of the Northeast," a digital game developed on the Wordwall platform by four students enrolled in the Technoteaching course at the Federal University of Ceará (UFC) during the second semester of 2023. The investigation focuses on interpreting its characteristics, structure, and formative potential, with an emphasis on understanding the object in its pedagogical dimension. This game incorporates content from biology, dance, English, and digital systems and media, highlighting cultural elements of the Brazilian Northeast. Because it concentrates on the analysis of a single MADE created by four students within a specific training context, the study presents limitations regarding the generalization of its results. The interpretations developed are therefore circumscribed to the object and context investigated, without aiming to represent the totality of experiences with digital authorial educational materials.

The development of the MADE was divided into three stages:

a) **Creation and planning:** in this initial phase, the students created the game script, selecting the themes and content of the involved areas, with an emphasis on interdisciplinary dialogue.
b) **Technical development:** this practical stage involved assembling the digital game,

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creating questions and answers, incorporating visual and audio elements, and configuring the gamified dynamic.

c) Presentation and evaluation: the phase in which the game was presented and evaluated by teachers and classmates according to previously defined pedagogical and technical criteria.

The description of the material and data interpretation were based on the defined theoretical categories:

- **Category 1: Epistemological basis and interdisciplinarity:** analyzes how the MADE articulates different fields of knowledge, highlighting the theoretical foundations that support its pedagogical proposal.
- **Category 2: Cultural integration and dialogue among areas:** examines the relationships established among the content of different areas of knowledge and their integration with cultural aspects of the Northeast.

Data were collected from the script of the MADE itself, developed by the students as a final product and from evaluation reports produced by the class and instructors, ensuring methodological triangulation among different sources of evidence, which strengthens the validity of the analysis (Yin, 2015).

The study was approved by the Research Ethics Committee under substantiated opinions No. 2,412,828 (year 2021) and No. 6,103,177 (period 2023–2024), both linked to the umbrella research project coordinated by the advisor, within the scope of which the investigation into the MADEs is situated. Given the informed consent of all participants involved, it is possible to present the results linked to the description and interpretive analysis of the MADEs developed by them, preserving the ethical principles of research involving human subjects.

This methodology enables a detailed and critical understanding of the pedagogical potential of digital authorial materials within the Brazilian educational context particularly in interdisciplinary projects that value local cultural diversity by highlighting not only the structure of the analyzed resource but also its formative implications for pedagogical practices.

4 RESULTS AND DISCUSSION

The MADE "Culture of the Northeast" is a Digital Authorial Educational Material developed by preservice teachers at UFC within the Technoteaching course. The game's pedagogical objective

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is to study the association between elements of popular dances—such as *forró*, *maracatu*, *capoeira*, *axé*, and *quadrilha junina*—and the use of fauna and flora linked to these cultural expressions, articulating such themes with content from biology, English, and digital media. This proposal demonstrates a pedagogical intentionality oriented toward the integration of different fields of knowledge, aligning with the interdisciplinary perspective advocated by Morin (2001) through the proposed overcoming of disciplinary fragmentation.

The proposal is implemented on the Wordwall platform and takes the form of a game show featuring ten interdisciplinary questions, a three-minute time limit for completion, and three lives. The game system is closed and individual, with Set Collection considered its primary mechanic, alongside elements of storytelling. These structural characteristics indicate the incorporation of playful elements as a pedagogical strategy, aligning with Kenski's (2012) understanding that digital technologies, when used with educational intentionality, can foster more dynamic and participatory practices. In this case, the game's primary mechanic does not appear disconnected from pedagogical goals; rather, they integrate the organization of the material and the modes of interaction with the content, reinforcing the importance of educational intentionality in the use of digital technologies.

The school contents addressed include, in biology, topics such as cytology, botany, physiology, and the environment; in dance, Northeastern popular poetics; in the English language, translation activities; and in digital systems and media, game mechanisms and structures. This diversity of content reinforces the interdisciplinary nature of the material by promoting connections among different fields of knowledge within the same educational experience, in line with Fazenda's (2014) understanding regarding dialogue and articulation between different areas of knowledge. The way these contents are mobilized in the MADE also dialogues with Lima, Silva, and Loureiro (2023) by highlighting possibilities for bringing distinct forms of knowledge together in the authorial production of preservice teachers.

The graphical and audio setting of the game evokes a television show, featuring a strong presence of regional cultural icons, while the interactive objects include prompts, answer choices, a timer, challenge cards, and a life system. This aesthetic and interactive construction acts as a mediating element of learning by bringing school content closer to the students' cultural repertoire, which dialogues with Prensky's (2010) perspective in recognizing technologies as extensions of human thought and daily lived experience.

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Chart 1: Main Technical and Pedagogical Aspects of the MADE

Elemento	**Descrição**
Título do MADE	Cultura do Nordeste
Tipo de MADE	Jogo digital no Wordwall
Tema	Expressões culturais nordestinas e suas relações com biologia, inglês e mídias digitais
Áreas do conhecimento	Biologia, dança, inglês e sistemas e mídias digitais
Conteúdos abordados	Citologia, botânica, fisiologia, meio ambiente, danças populares, tradução e mecânicas de jogos digitais.
Número total de questões	10
Modelo de jogo (Wordwall)	Game Show
Tempo para conclusão	3 minutos (tempo regressivo)
Número de vidas	3
Objetos do jogo	Enunciados, alternativas, cronômetro, vidas, cartas-desafio
Mecânica do jogo	Set Collection e Narração de Histórias
Ambiente	Game Show de TV
Formato de participação	Individual
Dispositivos necessários	Celular, computador e internet
Link de acesso ao MADE	https://wordwall.net/pt/resource/61238852

Source: Prepared by the authors (2025).

Based on the analytical categories defined in the methodology—epistemological basis, interdisciplinarity, cultural integration, and dialogue among areas—interpretations were conducted considering the discussed theoretical frameworks. In the first category, it was observed that MADE consistently stimulates the articulation among diverse forms of knowledge. The question regarding the white carnation (*cravo branco*), for example, invites the player to identify its botanical classification within the context of *Maracatu Rural*, promoting an intersection between biology and popular culture. This articulation demonstrates a pedagogical practice that breaks with content compartmentalization, favoring an integrated understanding of knowledge, as advocated by Morin (2001).

The observed integration closely aligns with the interdisciplinary perspective discussed by Fazenda (2014), in that it intentionally brings together different fields of knowledge around a single

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phenomenon. Another question revisits the origin of the word "*forró*," linking it to the English phrase "for all," which reveals an intentional attempt to bring English language learning closer to the student's cultural reality. This pedagogical choice demonstrates the contextualization of knowledge, fostering learning by connecting school content with the students' sociocultural universe.

Along the same lines, the question mentioning the acronym DNA within the context of Ariano Suassuna's critique of foreignisms stands out. This formulation articulates biology, language, and cultural identity in a single problem-situation, highlighting the complexity of knowledge and breaking away from disciplinary compartmentalization, as proposed by Morin (2001). By mobilizing a reference associated with Ariano Suassuna in dialogue with a scientific concept, the question illustrates how elements of regional culture can function as articulators between different fields of knowledge. Such an articulation reveals the presence of a consistent epistemological basis, in that it promotes the understanding of phenomena in their complexity and interrelation. The game, therefore, proves to be coherent with a perspective of interdisciplinary and epistemologically critical education, promoting the displacement of school content toward culturally situated contexts.

Regarding the second category, it was identified that the MADE sensitively integrates academic content and cultural expressions from the Northeast. Elements such as *axé*, *capoeira*, cassava (*mandioca*), and the *Lençóis Maranhenses* do not serve as mere attractions, but as structuring components of the game's narrative. The approach to cassava and *tapioca*, for instance, allows for connecting elements present in Northeastern food culture with the contents mobilized in the material, demonstrating how everyday references can inform the development of the proposed questions. This integration highlights the appreciation of local culture as a formative axis, aligning with what Silva and Almeida (2022) advocate in recognizing local knowledge as essential for strengthening the bonds between students and school knowledge. Such an approach contributes to contextualized learning by articulating scientific content with cultural practices experienced by the students.

In this context, the game's aesthetics, combined with its visual and audio language, enhance engagement and active learning, as argued by Kenski (2012), by reinforcing the role of digital technologies as mediators of formative and contextualized practices. Thus, the use of visual and interactive resources is not restricted to an aesthetic dimension; rather, it assumes a pedagogical function by fostering interaction and the construction of knowledge.

The preservice teachers' authorship in the game's development also deserves emphasis, highlighting the centrality of student agency in the training process. As Cruz and Giacomazzo (2023)

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argue, the production of authorial digital materials fosters pedagogical innovation and promotes the intellectual autonomy of future teachers. This characteristic also aligns with the perspective of Lima and Loureiro (2016), who understands the production of digital authorial materials as a process involving authorship, participation, and the shared construction of knowledge. In this sense, the process of building the MADE also constitutes a formative experience by engaging preservice teachers in practices of planning, creation, and pedagogical reflection. By mobilizing different fields of knowledge and incorporating elements of regional identity, the MADE "Culture of the Northeast" represents a relevant formative experience that contributes both to the consolidation of interdisciplinary practices and to the construction of a critical and contextualized teaching practice.

Finally, the data analysis allows us to affirm that the MADE responds positively to the proposed research question: Can Digital Authorial Educational Materials contribute to a contextualized and identity-based education? The analyzed experience indicates that they can, provided they are designed based on consistent theoretical frameworks, cultural sensitivity, and pedagogical intentionality. This finding reinforces the potential of MADEs as pedagogical devices capable of integrating culture, technology, and curriculum in an articulated manner. Among the positive aspects, key highlights include the coherence between proposal and execution, the integration across fields of knowledge, and the recognition of local culture as a formative axis. As an aspect to be improved, further deepening of questions addressing current social issues is suggested to expand the resource's critical potential. In summary, the analyzed MADE presents itself as a powerful proposal for strengthening educational practices that are plural, innovative, and socially committed to the students' reality.

5 FINAL CONSIDERATIONS

The analysis of the MADE "Culture of the Northeast" allowed for the conclusion that interdisciplinary proposals anchored in the valorization of local culture and mediated by digital technologies offer powerful avenues for resignifying the teaching-learning process. By articulating distinct areas such as biology, dance, English, and digital media, the analyzed material demonstrated the capacity to promote not only the learning of academic content but also the construction of broader meanings connected to the students' territory and identity.

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The study was based on the following research problem: how can Educational Digital Authorial Materials contribute to a more contextualized and identity-based education? To address this question, the objective was to analyze the MADE "Culture of the Northeast," seeking to understand how the articulation among culture, curriculum, and digital media can resignify teaching practice and promote contextualized, formative learning. The results obtained within the analyzed context indicate that the proposed objective was achieved, as the digital game demonstrated integration between school knowledge and local culture, fostered engagement, and stimulated student agency.

The digital game goes beyond the function of a mere instructional resource to constitute a formative experience in itself. The pedagogical intentionality expressed in the questions, the careful selection of cultural elements, and the integrated aesthetic proposal reveal a creative process guided by sensitivity, authorship, and a commitment to student learning within their sociocultural contexts. These aspects reinforce the understanding that student authorship and the valuation of local knowledge are fundamental elements for strengthening critical, plural, and contextualized teaching practices.

The analyzed MADE demonstrates that when there is openness to creation, attentive listening to contexts, and consistent theoretical articulation, the results tend to extend beyond the boundaries of the classroom. In this process, the game becomes an invitation to reflection, belonging, and engagement for both those who develop it and those who play it. Furthermore, it reaffirms the power of interdisciplinarity to combat curricular fragmentation and to build bridges between academic knowledge and students' daily lives.

Regarding the study's findings, it is recognized that it is situated within a specific context and focuses on the analysis of a single MADE produced by four students, which limits the generalizability of the results. Even so, the findings offer elements for reflection on formative processes that articulate student authorship, interdisciplinarity, regional culture, and digital technologies.

Therefore, it is recommended that future research explores the use of MADEs in basic education classrooms, investigating not only students' reception but also the impact on their learning, motivation, and cultural appropriation. Future studies could also expand this discussion by analyzing other MADEs produced in different training contexts, allowing for the comparison of experiences and deepening the understanding of their pedagogical contributions.

In summary, the MADE "Culture of the Northeast" reinforces the urgency of a school that dialogues with its community, embraces diversity, and promotes pedagogical practices capable of

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developing critical, creative individuals who are conscious of their identity. By integrating culture, technology, and interdisciplinarity, this material highlights the transformative potential of educational proposals committed to the students' reality and to the construction of a socially situated education.

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